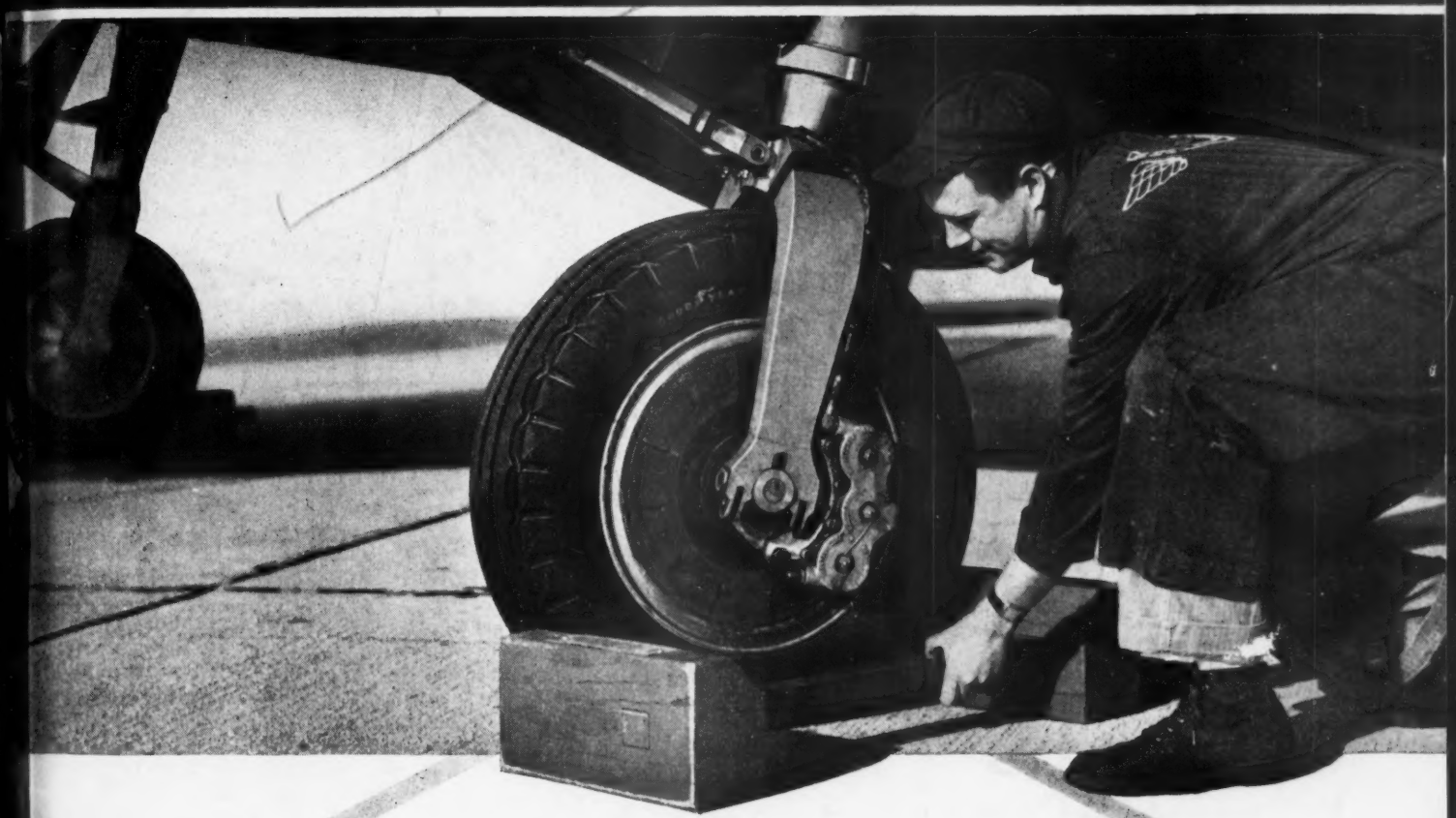
AVIATION WEEK

APRIL 4, 1949

A McGRAW-HILL PUBLICATION



It gives the Cutlass an edge

A heavy, super-fast ship like the Navy's new XF7-U tailless twin-jet fighter needs a plus in rugged landing-gear equipment. That's why it is fitted with Goodyear tires, tubes, wheels and brakes. The extra stamina of Goodyear tires and tubes—the extra strength of Goodyear lightweight magnesium alloy wheels—the extra braking power of Goodyear self-adjusting Single Disc Brakes — give the Cutlass a decided edge in safety in making quick, sure stops. For complete information about these and all other Goodyear Aviation Products, write: Goodyear Aviation Products Division, Akron 16, Ohio or Los Angeles 54, Calif.

GOODYEAR
AVIATION
PRODUCTS

MORE AIRCRAFT LAND ON GOODYEAR TIRES, TUBES, WHEELS A ID

TECHNOLOGY DPT
96 PUTNAM AV
DETROIT MICH

R v.50.2 April-June 1949

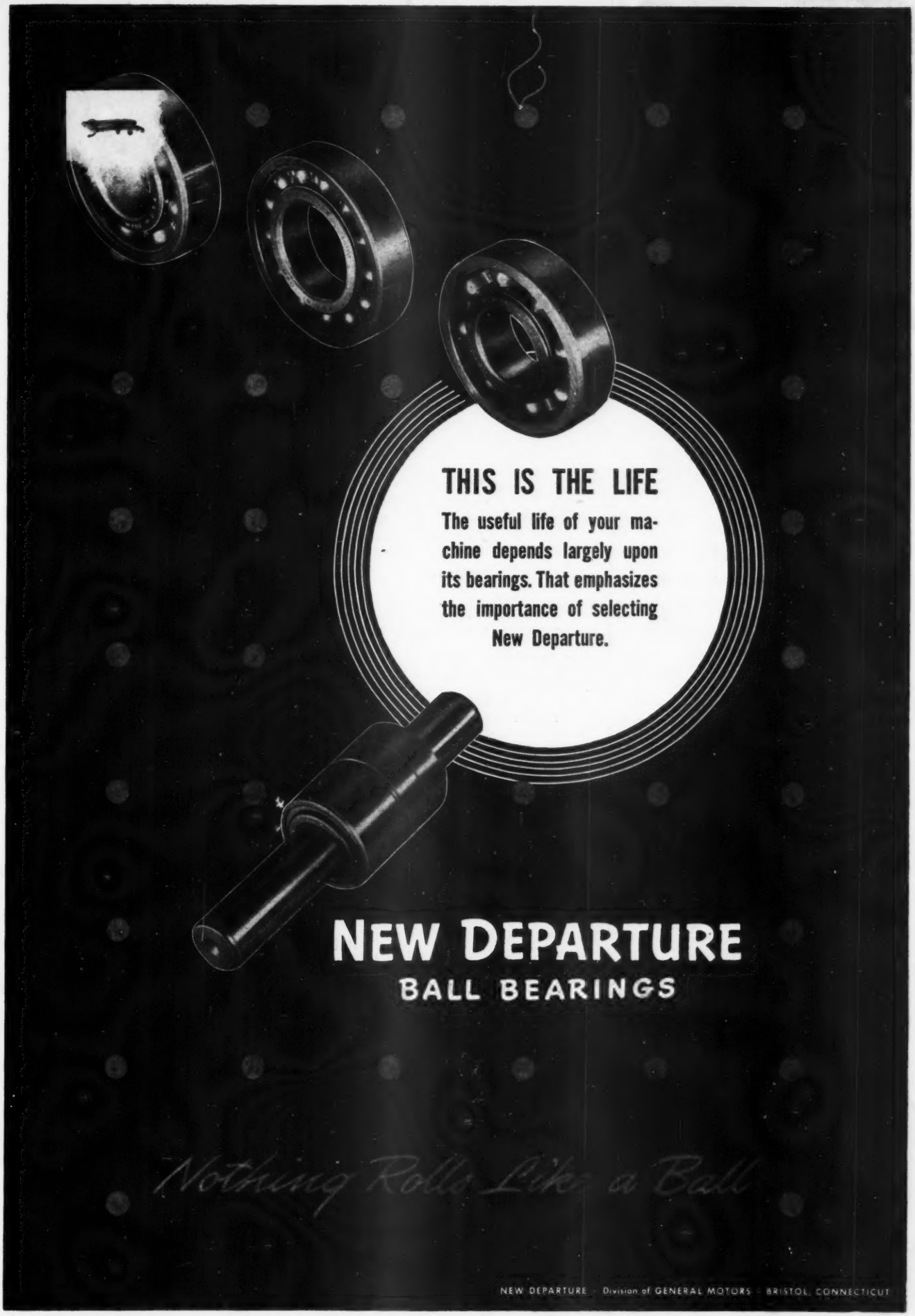
...no control system is better than the company and the engineering behind it

MINNEAPOLIS
Honeywell
AERONAUTICAL CONTROLS

CREATIVE ENGINEERING

MAKERS OF THE FAMOUS M-H ELECTRONIC AUTOPILOT, STANDARD ON ALL AAF 4-ENGINED BOMBERS

Tech


THIS IS THE LIFE
The useful life of your machine depends largely upon its bearings. That emphasizes the importance of selecting New Departure.
NEW DEPARTURE
BALL BEARINGS
Nothing Rolls Like a Ball
NEW DEPARTURE - Division of GENERAL MOTORS - BRISTOL, CONNECTICUT

AXELSON FIRST CHOICE

TOP FLIGHT

AVIATION EXECUTIVES AGREE

that Axelson engineering and plant facilities for the production of high precision aircraft components are among the finest available.

FOR PRECISION AIRCRAFT PARTS

such as landing gears, hydraulic struts, hydraulic actuators, gear boxes, transmissions, superchargers and variable speed drives, alternator drives and pressure regulator valves, Axelson is considered first choice by world leaders in aircraft manufacture.

Axelson is currently producing superchargers for cabin pressurization of the Douglas DC-6 airplane. Numerous Axelson experimental projects are under way, in design stage, production stage and on actual operating tests. Axelson engineering maintains constant research to provide more efficient equipment, combining economy with finest quality.

AXELSON
MANUFACTURING COMPANY

AIRCRAFT DIVISION

6160 South Boyle Ave.
Los Angeles 11, Cal.

Vol. 50, No. 14

AVIATION WEEK

April 4, 1949

The Aviation Week	7	New Products	38
Aviation Calendar	8	Letters	45
News Digest	11	Sales & Service	46
Industry Observer	11	Financial	51
Headline News	12	Air Transport	52
World News	18	Strictly Personal	64
Production	20	What's New	64
Engineering	25	Editorial	66

Robert H. Wood
EDITOR

Merlin H. Mickel
MANAGING EDITOR

Robert B. Hotz.....News Editor
Irving Stone.....Technical Editor
William Kroger.....Manufacturing
Alexander McSurely.....Sales & Service
Charles L. Adams.....Transport Editor
Robert McLarren.....Engineering
Katherine Johnsen.....Congress
Stanley L. Colbert.....Production Editor
Marie Adams.....Editorial Assistant
Scott H. Reiniger.....Editorial Assistant
Victoria Giaculli.....Editorial Makeup
Scholer Bangs....Los Angeles Correspondent

Executive and Editorial Offices: 330 W. 42d St., New York 18, N. Y., Phone Longacre 4-3035; National Press Bldg., Washington 4, D. C., Phone National 3414.

Domestic News Bureaus: Atlanta 3, Rhodes-Haverty Bldg.; Chicago 11, 520 N. Michigan Ave.; Cleveland 15, Hanna Bldg.; Detroit 26, Penobscot Bldg.; Los Angeles 14, 621 S. Hope St.; San Francisco 4, 68 Post St.; Houston, 514 South St. *Correspondents:* Boston, Buffalo, Dallas, Dayton, Denver, Indianapolis, Jacksonville, Kansas City, Knoxville, Lansing, Louisville, Memphis, Miami, Milwaukee, New Orleans, Oklahoma City, Ogden, Philadelphia, Phoenix, Pittsburgh, Portland (Ore.), St. Louis, Salt Lake City, Seattle, Wichita and 43 other cities.

Foreign News Bureaus: London, Paris, Frankfurt, Moscow, Tokyo, Bombay, Melbourne, Rio de Janeiro, Buenos Aires. Correspondents in Athens, Caracas, Santiago, Shanghai, Zurich, Rome, Johannesburg and over 40 other cities.

ECONOMIC STAFF
Dexter M. Keezer, Sanford S. Parker, William F. Butler, Robert P. Ulin.

Robert F. Boger
PUBLISHER

J. G. Johnson, *Business Manager;* R. W. Martin, Jr., *Sales Manager;* Sales Representatives: J. C. Anthony, New York; M. J. Storz, Philadelphia; V. K. Dissette, Cleveland; L. J. Biel, Chicago; W. E. Donnell, St. Louis; J. H. Allen, Dallas; R. C. Maultsby, Atlanta; J. W. Otterson, San Francisco; C. F. McReynolds, Los Angeles. Other sales offices in Pittsburgh, Detroit, Boston and London.

Member of Associated Business Papers, Inc., and the Audit Bureau of Circulations

McGRAW-HILL PUBLISHING CO., Inc., James H. McGraw (1860-1948), Founder. Publishing Office, 99-129 N. Broadway, Albany, N. Y. Editorial and Executive offices: 330 W. 42nd St., New York 18; 520 N. Michigan Ave., Chicago 11; 68 Post St., San Francisco 4; Aldwych House, London, W.C. 2; National Press Bldg., Washington 4, D. C.; Architects Bldg., 17th & Sansome Sts., Philadelphia 3; Hanna Bldg., Cleveland 15; 2980 Penobscot Bldg., Detroit 26; Continental Bldg., St. Louis 8; 1427 Statler Bldg., Boston 16; Rhodes-Haverty Bldg., Atlanta 3; 621 South Hope St., Los Angeles 14; 738-39 Oliver Bldg., Pittsburgh 22. JAMES H. McGRAW, Jr., President; CURTIS W. McGRAW, Vice-President and Treasurer; EUGENE DUFFIELD, Executive Assistant for Publications; NELSON BOND, Director of Advertising; JOSEPH A. GERARDI, Secretary; J. F. BLACKBURN, Jr., Director of Circulation . . . Aviation Week, 330 W. 42nd St., New York 18. Published weekly, price 50¢ a copy, 50¢ in Canada. Allow at least ten days for change of address. Address all communications about subscriptions to Director of Circulation, 330 W. 42nd St., New York 18, N. Y. Subscription rates—United States and possessions, $6 a year, $9 for 2 yr., $12 for 3 yr. Canada, $7 for 1 yr., $11 for 2 yr., $14 for 3 yr., payable in Canadian currency at par. Pan American countries, $10 for one yr., $16 for 2 yr., $20 for 3 yr. All other countries, $20 for 1 yr., $30 for 2 yr., $40 for 3 yr. Please indicate position and company connection on all subscription orders. Entered as second class matter July 16, 1947, at Post Office, Albany, N. Y., under Act of March 3, 1879. Volume 50, Number 14. Printed in U.S.A. Cable address "McGraw-Hill New York." Member A.B.C.

Copyright, 1949, McGraw-Hill Publishing Co.

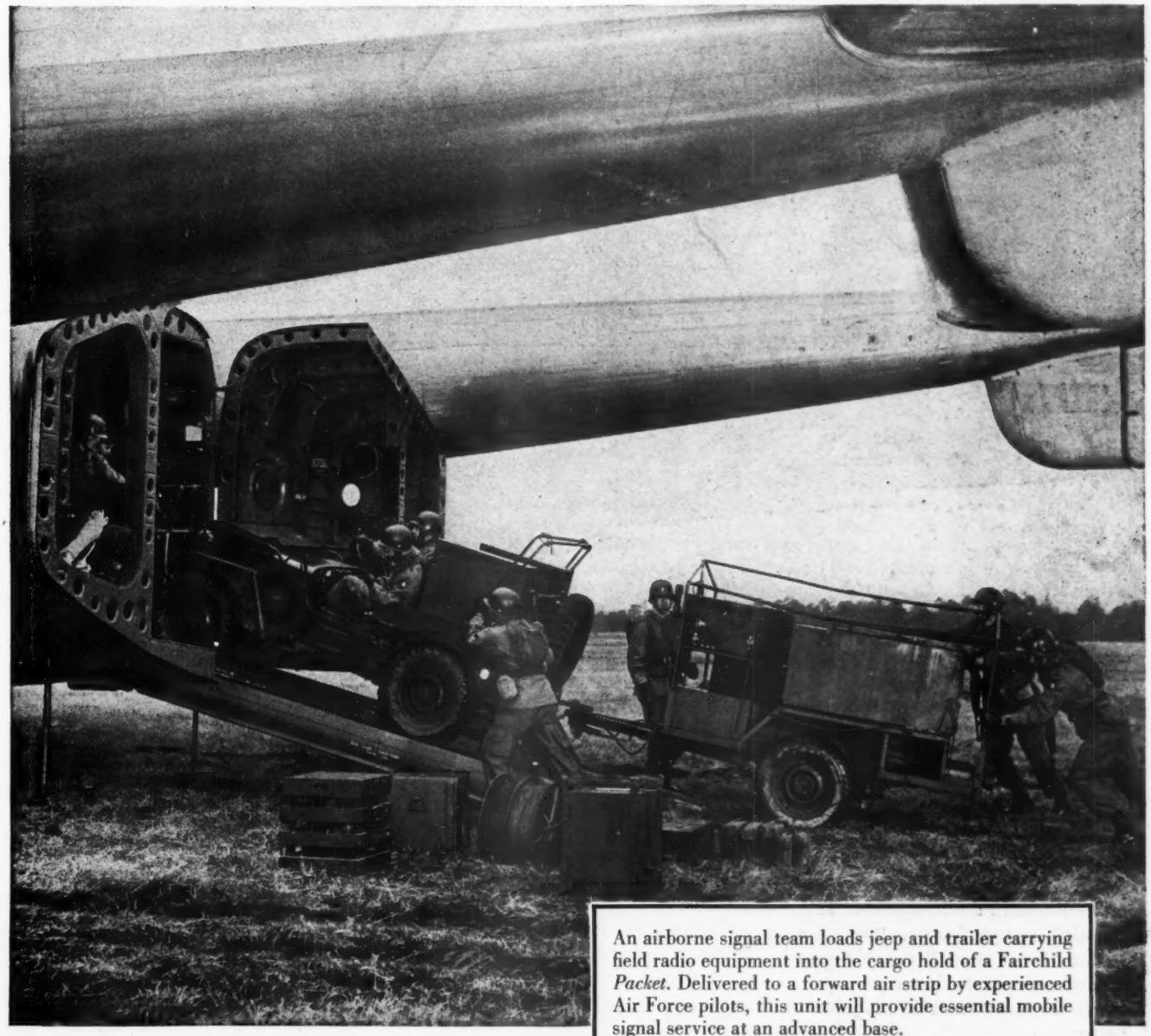
Aviation Week is indexed in "Reader's Guide to Periodical Literature", "Engineering Index" and "Industrial Arts Index". Publications combined with AVIATION WEEK are AVIATION, AVIATION NEWS, AIR TRANSPORT, AERONAUTICAL ENGINEERING and AIRCRAFT JOURNAL.

All rights to these names are reserved by McGraw-Hill Publishing Co.

AIRLIFT

National security depends largely upon the full use of air power in all its phases. One vital operation is airlift—dramatically pointed up by the air supply of Berlin and more recently by food-rescue missions in the snowbound areas of the West.

Fairchild has developed and produced cargo and troop transports designed for airlift. The C-119 *Packet*, soon to succeed the C-82 *Packet*, will further demonstrate the ability of the aircraft industry to meet the requirements of modern airlift tactics.



An airborne signal team loads jeep and trailer carrying field radio equipment into the cargo hold of a Fairchild *Packet*. Delivered to a forward air strip by experienced Air Force pilots, this unit will provide essential mobile signal service at an advanced base.

FAIRCHILD ENGINE AND AIRPLANE CORPORATION
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Divisions: Fairchild Aircraft, Hagerstown, Md. • Ranger Aircraft Engines, Farmingdale, N. Y. • Nepa, Oak Ridge, Tenn. • Fairchild Personal Planes, Strother Field, Kansas
Fairchild Pilotless Plane, Farmingdale, N. Y. • Al-Fin, Farmingdale, N. Y. • Subsidiaries: Stratos Corporation, Farmingdale, N. Y. • Duramold Aircraft Corporation, New York 20, N. Y.

Airlines fly on *Good Groundwork*

Commercial airline profits are made in the air . . . and good groundwork in the factories and in the hangars means more time between overhauls, less time on the ground.

It's the maintenance man's good groundwork in the hangar that keeps the airliner tuned up to take off on schedule . . . and Sperry's good groundwork in the laboratory and in the factory helps him do his job even better and quicker.

Every piece of Sperry aeronautical equipment is engineered and manufactured to give the maximum of trouble-free hours in the air . . . and for easy accessibility and servicing on the ground at the regular scheduled airline overhaul periods.

To make servicing of Sperry products still easier for the maintenance crew, Sperry conducts special training schools. Here the airlines' key maintenance personnel learn to service Sperry equipment and teach others in its best use . . . all to assure more efficient and more economical operation.

And in the field, Sperry Service Engineers themselves are always on call whenever, wherever service is needed. Most of these men are graduate engineers. Their main job is to help the customer by making sure that his Sperry equipment and its installation give him the best possible service.

Meanwhile, Sperry research and engineering look to their Field Service Engineers and the many Sperry-trained maintenance men among its customers for the vital performance data that help Sperry build new and better aids for aviation.

SPERRY GYROSCOPE COMPANY

DIVISION OF THE SPERRY CORPORATION • GREAT NECK, N.Y.

NEW YORK · CLEVELAND · NEW ORLEANS · LOS ANGELES · SAN FRANCISCO · SEATTLE

NEWS SIDELIGHTS

Weather Reports

One of the long-standing gripes of the Air Transport Assn., and Air Line Pilots Assn., is the inaccurate weather reports on terminal conditions issued by local observers or control tower personnel.

To improve operational efficiency in bad weather, airports on the Berlin airlift now have weather observers stationed on the approach end of each operational runway to give up-to-the-minute reports on actual conditions over the end of the runway—the weather the pilot is interested in most.

Ground Control

Another significant contribution to the science of air traffic control to come out of operational experience on the Berlin airlift is the indication that any high density traffic in bad weather must be controlled completely from the ground.

Bad weather traffic on the Berlin airlift is under strict ground control from takeoff to landing and traffic controllers who organized this high density, instrument weather traffic pattern are convinced that there is no other way to handle it with as high a safety factor. Both Air Line Pilots Assn. and individual airlines can be expected to put up a strong fight against strict ground control of airline traffic by a single agency.

Power Switches

Current debates in Air Force top levels over relative merits of turbojet and turboprops have confused manufacturers all the way from airframe and engine producers down to small accessory makers.

USAF top planners have made one complete swing of the pendulum from turbojets to turboprops and now back to turbojets but the word on some of the latest powerplant decisions hasn't yet filtered down to the lower operational levels.

Good example is the Boeing B-52, originally a turboprop design that was recently switched to turbojet. USAF cancelled production of the Wright T-35 turboprop scheduled for the B-52 but contractors have not yet been notified of the B-52 power switch.

Shop Critics

Airline criticism of airframe manufacturer workmanship has been chronic for 20 years both with and without good reason but it should be a major concern of the latter that the same complaints are being registered today. Inferior electrical connections, poor integral tank sealing, obviously awkward routing of hydraulic and fuel lines, ineffective duct sealing, etc., all point to improper selection and training of shop personnel who are employed today in the industry.

Airlines quarrel little today with the engineering design features of new aircraft but point out that most, if not all, of the advantage of such progress is lost when the installation is sloppily made. Airframe industry has been fully cooperative in field service changes, reworking and replacement of such items but this results in enormous expense and wasted time that could have been saved by simply doing the job right in the first place.

As one airline engineer points out: "We've been using solder for 50 years so I don't think it's simply a problem of eventual education!"

Standard Cockpits

Watch for stronger pressure from Civil Aeronautics Board and Military Air Transport Service for standardized cockpit layouts on U.S. airline transports.

Much of the exceptional safety record on the Berlin airlift is credited to the standardized C-54 cockpit arrangement that enables replacement crews to function efficiently without detailed checkouts. Air Line Pilots Assn., also plugging for standardized transport cockpits, found not only that no two U. S. airlines have the same cockpit layout for the same type planes but that one airline has four different cockpit arrangements in its own fleet.

Pilots are also howling for simplified cockpit engineering that designs a cockpit around the pilot rather than squeezes the pilot into space left over after all gadgets and instruments are installed.

Lightplane Routes

Legislation opening Post Office business to lightplane airline operators has been asked by the Department and is expected to slip through Congress without opposition.

It would remove the present limitation of five on the number of air Star routes—comparable to truck routes—the Department can operate on a contract basis.

Department could let air Star route contracts only for service not covered by certificates awarded by Civil Aeronautics Board.

Chairman Tom Murray (D., Tenn.) of the House Post Office and Civil Service Committee has introduced the legislation, now pending before his committee.

Flight Engineers

In contrast to their original bitter battle against flight engineers, airlines generally are pleased now with this addition of a third man in the cockpit. He has proved a tremendous help to maintenance men by presenting more thorough descriptions of in-flight difficulties than was obtained from regular pilots in the past.

The airlines are also putting the flight engineer to work on the ground, where he serves as virtual crew chief during loading and unloading of cargo and servicing of the airplane. One unsuspected quality in the flight engineer, surprising alertness to emergency conditions, has assuaged earlier airlines fears of incompetency on the part of the third man in the cockpit.

Flight engineers reportedly have feathered engines, shut down cabin pressure turbines and cut off heaters that have blown out at high altitude in only fractions of a second after the dials indicated malfunctioning and substantially faster than pilots and copilots have demonstrated in the past. Airlines generally feel the "third man" has proved money well spent.

FEIA vs. ALPA

A jurisdictional brawl may be in offing between the Flight Engineers International Assn. and the Air Line Pilots Assn. over organizing flight engineers.

FEIA has a charter from the American Federation of Labor giving it the sole right to organize flight engineers. Yet ALPA organizers are quietly busy among this group. Dave Behncke, boss of ALPA, also an AFL affiliate, is reported to feel that his union's charter gives it the right to organize all airline flight personnel. And ALPA's charter was granted in the mid-thirties, while FEIA has just concluded its organizational meeting.

1 Trim Trol Tab Actuator with Filter and Transmitter designed for installation in the leading edge where it can serve as mass balance. ZERO BACKLASH at output shaft permits operating tab with simple link to obtain varying mechanical advantage increasing with load.

2 Lineator Linear Actuator with Filter and Transmitter operating loads to 1500 pounds with low basic weight Static capacity over 5000 pounds. Performance characteristics variable to suit application.

3 ROTORAC Right Angle type with Filter and Transmitter for driving screw jacks or flex shafts. Typical rating 15 inch pounds at 60 R.P.M. on 3 minutes out of 15 duty cycle. Higher ratings depending upon application.

4 Servo Systems Incorporating our electromechanical equipment to obtain synchronizing or positioning effects from any type of signal for automatic operation or for manual control eliminating indicators.

5 ANG Gear Standardized bevel gear drive for use in either manual or power operated systems. Anti-friction bearings and hardened gears. 500 inch pounds ultimate. Pressurized seal on mounting end optional.

AIRBORNE

ACCESSORIES CORPORATION

25 MONTGOMERY STREET • HILLSIDE 5, NEW JERSEY

Sales Representatives

JAMES L. ADAMS & CO. • LOS ANGELES 6, CAL.

W. N. WRIGHT • DALLAS, TEXAS

AVIATION CALENDAR

Apr. 5—Symposium on radio aids to navigation, transportation division, American Institute of Electrical Engineers, New York section. Consolidated Edison Bldg. auditorium, New York City.

Apr. 7—IAS New York Section meeting; "Design Analysis of F-84 Airplane," by C. E. Pappas, chief of aerodynamics, Republic Aviation Corp.; and "Operating High-Speed Jet Fighters," by Capt. John D. Sandifer, engineering officer, 37th Fighter Squadron. McGraw-Hill Building, New York City, 8:00 P. M.

Apr. 11-13—Society of Automotive Engineers national aeronautic and air transport meeting, Hotel New Yorker, New York.

Apr. 11-16—Western Metal Congress and Exposition, sponsored by American Society for Metals, Shrine Civic Auditorium, Los Angeles, Calif.

Apr. 19-20—Fifth annual meeting of the Magnesium Assn., Edgewater Beach Hotel, Chicago.

Apr. 19-21—AIEE southwest district meeting, Baker Hotel, Dallas, Tex.

Apr. 21-22—National Agricultural Aviation Conference, Municipal Auditorium, Kansas City, Mo.

Apr. 24-27—American Assn. of Airport Executives convention, Oklahoma City.

Apr. 29-30—Sixth IAS personal aircraft meeting Hotel Allis, Wichita.

Apr. 30-May 1—Fourth annual southeastern air show and exposition, Craig Field, Jacksonville, Fla.

May 2-4—Second annual meeting of the Airport Operators Council, Denver.

May 3-20—Third annual foreign transportation institute, American University, Washington, D. C.

May 5-6—Purdue University School of Aeronautics air transportation conference, Lafayette, Ind.

May 10—IATA traffic conferences, Europe.

May 17—IATA technical conference, Switzerland.

May 18—National Fire Protection Assn. committee on aviation and airport fire protection, Fairmont Hotel, San Francisco.

May 19-21—Society for Experimental Stress Analysis, spring meeting, Hotel Statler, Detroit, Mich.

May 23-26—Eighth national conference, Society of Aeronautical Weight Engineers, Inc., Biltmore Hotel, Dayton.

May 24-27—Second joint conference of IAS, Royal Aeronautical Society, Hotel Astor, New York City.

May 26—IATA executive committee, Montreal.

June 3-12—Sixth annual Michigan Aviation week.

June 4-5—Fourth annual air fair and industrial exposition, Shawnee, Okla.

June 7—Third ICAO assembly, Montreal.

June 20-24—AIEE, summer general meeting, New Ocean House, Swampscott, Mass.

June 26-27—NAA 27th annual national convention, Akron, Ohio.

June 27-29—Formal dedication of Naval Ordnance Laboratory aeroballistics division, followed by five half-day technical sessions, White Oak, Silver Spring 19, Md.

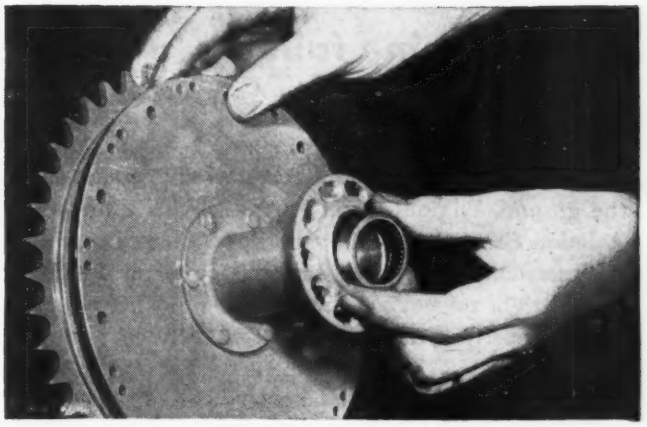
June 30-July 1—American Physical Society fluid dynamics division, Naval Ordnance Laboratory, White Oak, Silver Spring 19, Md.

PICTURE CREDITS

12—Wide World; 15—Fairchild; 16—Martin; 52—Todd Shipyards Corp.; 54—Capital Airlines.

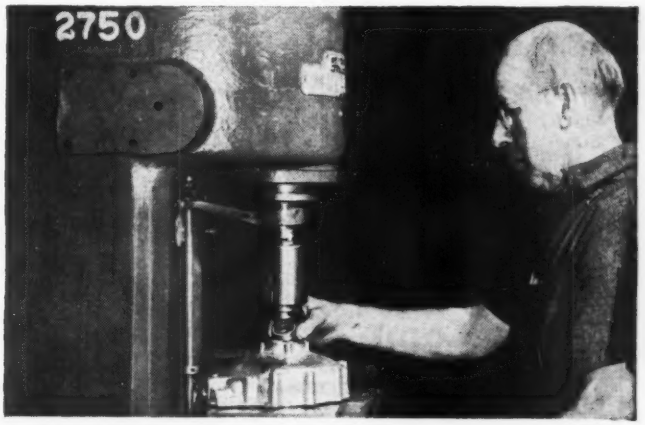
Torrington Needle Bearings Specified For Lighter Design and Longer Life In Indian Motorcycles

The new Arrow and Scout Motorcycles are designed throughout for lightness, power, safety and economy by Indian Motocycle Company. To withstand severe shock loads, reduce friction and secure compact design, Indian specifies Torrington Needle Bearings—22 in the Arrow and 24 in the Scout.



Needle Bearings take the jar of rough riding at high rotating speeds in the rear wheel hub (above) and the front wheel hub. With their full complement of small diameter rollers, Needle Bearings take less space and provide higher radial capacity than any other comparable anti-friction bearing.

More horsepower per pound is delivered by the new Indians. Power loss is reduced with 8 Needle Bearings in the transmission. Two Needle Bearings on the main shaft give unusual stability, assuring efficient sealing with the standard oil closures pressed in behind them.



Manufacturing economy is assured by the easy installation of Needle Bearings in simple, easily-fabricated housings. Needle Bearings mean operating economies, too—minimum attention for maintenance and lubrication. Past experience indicates these efficient bearings will serve the life of the motorcycles.

Lightweight design, high capacity, long service life and economical production can be yours with Torrington Needle Bearings. Our engineers will be glad to help you adapt these compact anti-friction units to the requirements of your equipment. Write us today. THE TORRINGTON COMPANY, Torrington, Conn., or South Bend 21, Ind. District offices and Distributors in principal cities.

TORRINGTON NEEDLE BEARINGS

Needle • Spherical Roller • Tapered Roller Straight Roller • Ball • Needle Rollers

PLANE FAX

A page of service tips for private flyers and fixed-base operators

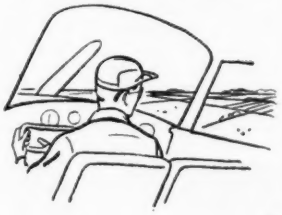
Avoid engine failure during take-off

Proper warm-up is a "must" for safe take-off. Don't take chances on a cold engine that doesn't "rev up" on the ground. Engines warm up faster with Chevron Aviation Gasoline without vapor-lock. That's because this premium-quality fuel is scientifically blended with just the right amount of light fractions for extra power and peak performance under all conditions.

Four quick do's and don'ts in case your engine conks out during take-off.

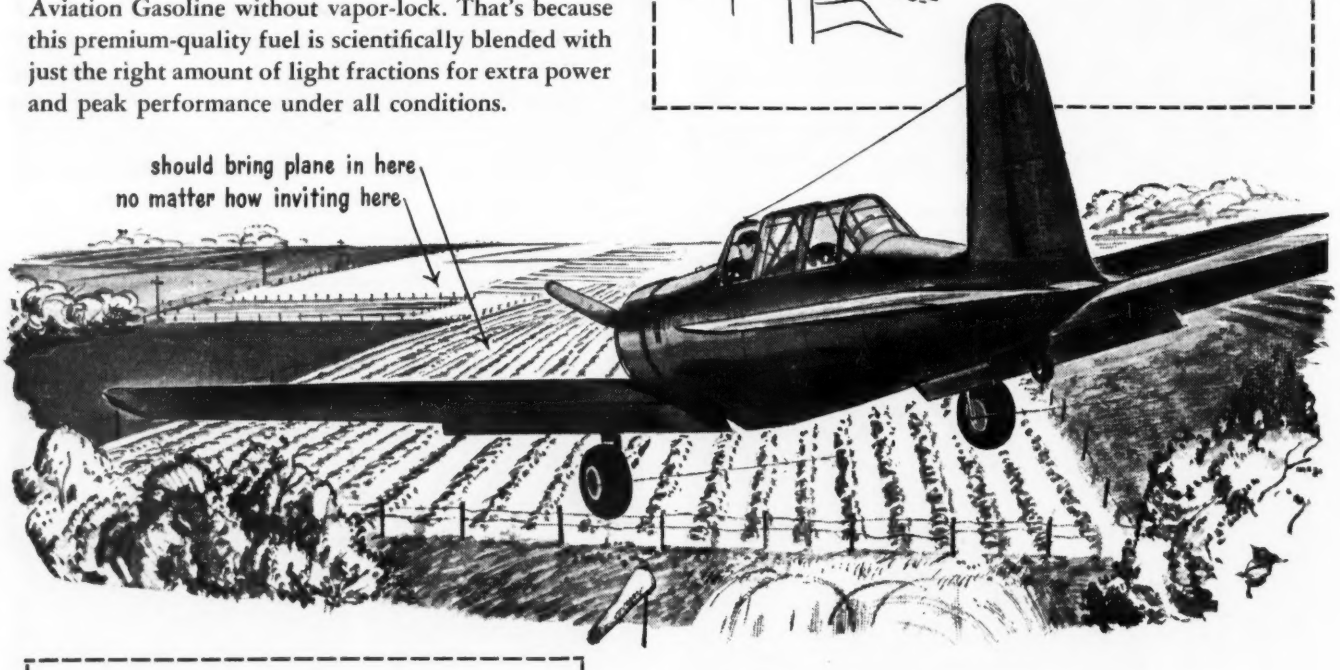
① Pick a spot—fast—for a forced landing

② Get the nose down

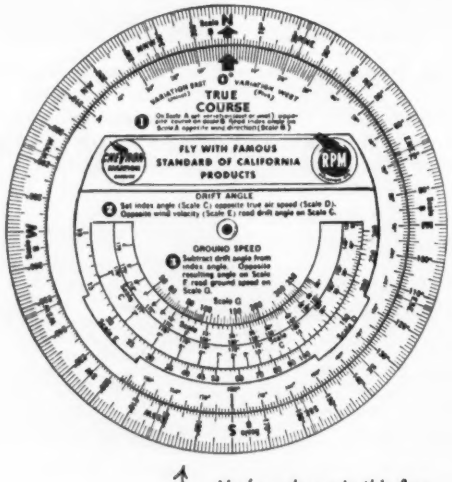


③ Don't bank sharply

④ Don't stretch the glide



Compute fuel consumption with your flight indicator



You're welcome to this free speed and distance calculator

Your handy little flight calculator helps you work fuel-consumption problems as you work time, speed and distance problems. Simply substitute gallons for miles, and gallons-per-hour for miles-per-hour. If you haven't received your calculator yet, drop in to your Standard Airport Dealer for your free copy soon.

"We take better care of your plane"

CHEVRON AVIATION GASOLINE

RPM AVIATION OIL

Standard Oil Company of California

NEWS DIGEST

DOMESTIC

Flight Engineers International Assn. elected Lawrence Huron (Pan American) president, William Crickman (American Overseas) executive vice president, and Sidney Carter (TWA) secretary-treasurer at its organizational meeting. Officers will serve for balance of year. Next meeting is slated for October.

Port of New York Authority negotiations with airlines serving New York City took favorable turn last week under guidance of New York Supreme Court Justice Thomas Cuff. Both sides appeared hopeful of early settlement.

Lt. Col. Albert W. Stevens, co-holder of world's altitude record, died at Letterman General Hospital, Redwood City, Calif., at the age of 63. On Nov. 11, 1935, Col. Stevens and Capt. Orvil A. Anderson ascended from Rapid City, S. D., in a free balloon and reached 72,395 ft.

Gen. Billy Mitchell's papers, including letters, diaries, photographs and manuscripts, have been deposited in the Library of Congress, Washington, D. C., as a gift to the nation from Mrs. Thomas Bolling Byrd, Mitchell's widow, and her children.

FINANCIAL

Boeing Airplane Co. reports profit of $1,715,908 for year ended Dec. 31, 1948, on income of $127,304,661. Company wrote off $7.2 million of a loss on the Stratocruiser project that is expected to total $10.5 million. Backlog at year-end was $445,741,075, of which about $85 million was commercial.

American Airlines reports loss for 1948 of $2,894,000 on revenues of $89,286,000, without effect of temporary mail rate award of Feb. 21. Profitable operations in the last three quarters could not overcome first-quarter loss of $4,285,000.

Western Air Lines reports profit of $134,704 for the year ended Dec. 31, 1948, on revenues of $10,463,231. Company had loss of $79,456 before tax adjustments.

FOREIGN

Russia has awarded the Order of Lenin to Andrei Nikolayevich Tupelov, the Soviet's leading aircraft designer. Grant was made on Tupelov's 60th birthday anniversary. He has been connected with Russian aviation for 40 years.

Pan American-Grace Airways, for completing five years without an accident, received a special award from the Inter-American Safety Council.

INDUSTRY OBSERVER

► Watch for a growing trend toward Delta wings on supersonic interceptors. Convair has a new Delta wing interceptor project for the U. S. Air Force based on initial flight experience with its Model 7002 which is flying again at Muroc after adjustments to its elevon controls. Douglas also has a Delta wing design in the mill for a Navy supersonic interceptor powered by twin turbojets. Top British designers have also indicated that is the direction they are traveling for aircraft with speeds up to Mach 1.8.

► Glenn L. Martin Co. is still working on the prototype of the XB-51 Air Force bomber at its Baltimore plant. It will be classed as a "medium" bomber according to current USAF designations.

► Bell Aircraft Corp. claims two unofficial records for its helicopters. A five-place XH-12 model built for the U. S. Air Force was clocked at 133.9 mph. over a measured course at Niagara Falls airport. This betters the previous unofficial mark of 131 mph. set by a Piasecki XHJP-1, an experimental seven-place model built for the Navy. A Bell Model 47 two-place helicopter recently set an unofficial altitude record of 18,550 ft. for non-supercharged engines.

► Sabena, the Belgian airline, reports the following new equipment acquired last year; three Douglas DC-6s, six Convair-Liners; three converted C-47s for operation and five more for spare parts cannibalization; and three de Havilland Doves, for operation in the Belgian Congo. Lightplane sales in Belgium were extremely slow with one Aeronca; ten Piper models and two Cessnas sold during the past year by local distributors.

► KLM, the Dutch airline, is shopping for an additional 30 twin-engine transports. KLM has taken delivery on seven Convair-Liners for its European service and expects to get five more during 1949. Glenn L. Martin Co. and Saab Aircraft Co. of Sweden are competing for the new KLM order with the 2-0-2 and the Scandia respectively. KLM has taken delivery on six Douglas DC-6s for its South American and South African service and two more Lockheed Constellations for the Batavia run.

► SAAB now has orders for 24 of the Scandia transports: ten from ABA (Sweden); seven from DDL (Denmark) and seven from DNL (Norway). SAAB hopes the scheduled devaluation of the Swedish crown will offer an entry into the American market. SAAB is aiming for a U. S. sales price of $250,000 at the proposed new exchange rate. This is about half the current price for new U. S. twin-engine equipment.

► Aquaflight, Inc., Wilmington, Del., company that is flying prototype of new executive-type Amphibian (Aviation Week, Feb. 14), is negotiating for financing with Texas oil interests. If successful in raising capital Aquaflight probably will seek an agreement for Bellanca Aircraft Corp. to produce the plane.

► Spartan Aircraft Co. has extensively rebuilt and improved its executive transport and expects to put it into production if when market conditions justify. Plane has been flown more than 400 hr.

► Latest reports on British turbojet development indicate the following new models: Rolls-Royce Avon (RA-1 and RA-2), undisclosed power rating; new model of the de Havilland Goblin (DGN-4); latest version of the Rolls-Royce Nene (RN-3), rated at 5500 lb. static thrust; and the Armstrong Siddeley Adder, developed from the Mamba Turboprop and rated at 1055 lb. static thrust. De Havilland's Ghost (DGT-2) has now been fully type-tested and is rated at 4450 lb. static thrust.

► Navy bombers used a guided missile attack as a screen for their atom bomb attack on the fleet during Caribbean maneuvers. Defending Navy fighters were able to break up the missile attack but it diverted their defense to enable the Lockheed P2Vs to slip in for their strike at the Navy carriers.

Vol. 50, No. 14

AVIATION WEEK

April 4, 1949

Douglas Sues Canadair for $1.4 Million

Action may affect pending deals to grant foreign firms rights to make U. S. planes.

By Alexander McSurely

LOS ANGELES—Two new developments in the complex picture of Canadian negotiations to manufacture U. S. planes are expected to clarify relations between Canadian and U. S. companies.

• **North American Aviation, Inc.,** Inglewood, disclosed it has authorized final negotiations on a contract with Canadair, Ltd., Montreal, to build F-86A jet fighters, with "ironclad" clauses restricting sale of the Canadian-built licensed fighters and parts to the RCAF, whose budget for fiscal 1950 contains about $30 million for purchase of nearly 100 Canadair-built F-86As.

• **Douglas Aircraft Co.,** Santa Monica, filed two suits for damages of more than $1.4 million against Canadair, for alleged contract violations, and asked court orders restraining further violations. Suits were filed in Superior Court of Quebec Province, by Canadian attorneys for Douglas.

Third American manufacturer interested in similar license agreements, Fairchild Engine & Airplane Corp., reported no further progress in negotiations with Canadair on rights to build the C-82 and C-119 military transports, pending settlement of whether Canadair would be permitted to sell the transports or parts outside the limits of Canada.

A Feb. 29, 1944 contract licensing the Canadian government to build four-engine transports of Douglas design and to sell parts for transports manufactured under the agreement, is basis for one of the Douglas suits which claims $300,000 damages. The license was assigned by the Canadian government to Canadair. Donald W. Douglas, president of the company bearing his name, pointed out that neither suit involved the Canadian government "with whom our relations have been and continue to be amicable and satisfactory."

▶ **C-47 Spares**—The second suit, involving a June 28, 1946 contract made directly with Canadair, claimed damages of over $1 million for alleged violations of the agreement. It provided for licensing the Canadian firm to make and sell spare parts for Douglas C-47 airplanes upon payment of royalties to Douglas. Petition states that after termination of this contract, Canadair has continued to manufacture spare parts which it has sold in the U. S. and elsewhere in breach of the original agreement.

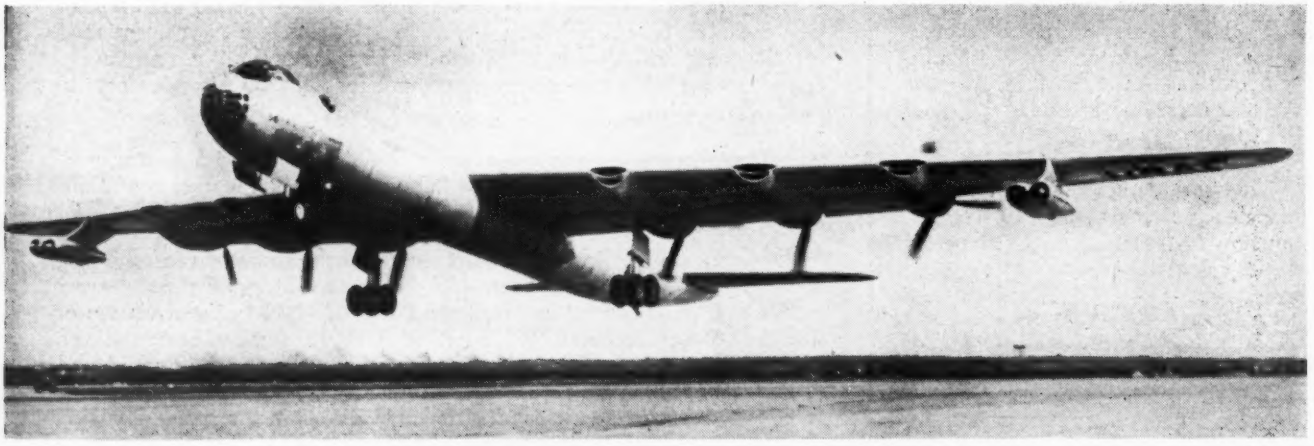
Douglas states that the litigation was undertaken only after every reasonable effort had been made to resolve differences without recourse to the courts. First contract, according to Douglas, restricted sale of four-engine planes and parts to exclusive rights in Canada and non-exclusive rights in the British Isles.

▶ **Claim U. S. Sales**—It is claimed by Douglas that Canadair has been selling in the U. S. and elsewhere, parts for C-47s, and DC-4s through Canadian Commercial Corp., an agency handling foreign trade arrangements for the Canadian government. Such sales, including sales of parts to the USAF, were in violation of the licensing agreements, it is charged.

Canadair denied Douglas charges and said it would contest the suit.

Major factor behind the legal controversy is the labor wage differential between U. S. and Canadian firms. Canadian aircraft worker wages are nearly 40 percent below those paid to comparable skills in U. S. aircraft plants, thus enabling the Canadian firm to undersell the original manufacturer.

The licensing agreements provided for Douglas to make available to Canadair the engineering data and assistance in setting up equipment, etc., to manufacture the planes and parts. Douglas contends that if this had not been made



CONVAIR GIANT GETS JET BOOST

First flight of the prototype Convair B-36D is shown here on takeoff at Fort Worth using a total of 40,000 hp. developed from six Pratt & Whitney Wasp Major piston engines and four Allison J-35 turbojets. The B-36D took off with a gross weight of 280,000 lb. in 3500 ft. of runway. Composite powered bomber was aloft for 3 hr. 15 min. on its initial test flight and reached an altitude of 40,000 ft. Convair test pilots B. A. Erickson and A. S. Witchell were at the controls. Underslung jet nacelles used on the B-36D prototype were made by Convair. Production model will use General Electric J-47 turbojets.

available, the Canadian company would not have been able to begin production.

While on the surface an international legal controversy, the suit actually involves two U. S. protagonists, for Canadair is virtually entirely owned by Electric Boat Co., a U. S. firm. Results of the Douglas-Canadair litigation is expected to have a strong effect on any further negotiations for licensing manufacture of U. S. planes in other countries.

Agencies Disagree On 70-Group Bill Details

Sharp split between the U. S. Air Force and the Bureau of the Budget was revealed last week in hearings on the 70-Group Air Force bill before the Senate Armed Services Committee.

The Budget Bureau principally objected to detailing the aircraft procurement authorized under the bill and specifying the functions of the 70 regular Air Force groups and their supporting reserves.

Capitol Hill observers agreed with the USAF contention that Budget Bureau amendments to the bill would strip it of its force and significance. Congressional sentiment indicated little sympathy for the Budget Bureau proposals.

▶ **Overwhelming Vote**—Although the majority of Congressmen appear resigned to the economic fact that the Federal government can afford funds to implement only a 57-Group Air Force during fiscal 1950 there is almost solid-front support on Capitol Hill for the principle of a 70-Group program. The only opposition to its authorization comes from the small left-wing element —Rep. Vito Marcantonio (ALP, N. Y.), Rep. Emanuel Celler (D., N. Y.), Rep. Adam Powell (D., N. Y.). The 70-Group authorization measure passed the House by an overwhelming 395-4 vote, and is now pending before the Senate Armed Services Committee.

Under Budget Bureau's proposals to the committee's chairman, Sen. Millard Tydings (D., Md.), the 70-Group authorization would be watered down to little more than an authorization for a USAF of 502,000 men. Assistant Secretary of Air Force Eugene Zuckert vigorously opposed Budget Bureau's recommendations, which were:

• **Wipe Out the "70-Group" Stipulation.** As passed by the House, the authorization provides that "the Air Force of the United States shall have an authorized strength of 70 U. S. Air Force groups, 22 separate U. S. Air Force squadrons, and 61 Air Force Reserve groups, together with necessary supporting and auxiliary U. S. Air Force Reserve units." Budget Bureau argued that the composition should not be set down in law, but instead made a matter of "executive determination" from year to year.

Budget's assistant director, F. J. Lawton declared: "The reasons advanced for desiring that legislation specify the unit composition of the Air Force ignore the fact that such specifications are, in effect, limitations. Administrative discretion of the Army and Navy with respect to unit organization is not so restricted. The issue here is not whether the number of combat elements in the Air Force should be 10 or 70 or 200, but whether such a prescription of unit organization is an appropriate matter for legislative or executive determination." Most aviation observers agree that without a 70-Group authorization in law Air Force would have no ground to stand on in seeking funds from the Budget Bureau from year to year to implement the program. The public would also be without a yardstick to measure the type of Air Force recommended by defense chiefs against the type allowed by Budget Bureau.

• **Remove Procurement Specification.** The authorization bill provides that "the Secretary of Air Force is authorized to procure 5200 aircraft or 42,500 airframe tons annually, whichever amount . . . is more appropriate. . . ." Budget Bureau requested that this annual procurement specification, set by the President's Air Policy Commission as the minimum for keeping a modernized 70-Group program, be replaced with the vague provision that annual procurement of planes be in "the amounts required".

Budget Bureau's Lawton argued: "The prescription in a basic statute of the number of aircraft or airframe tons to be procured annually would ignore the fact that the number of aircraft or the weight of airframes required to maintain the air force should be subject to frequent, searching review. Making such a determination an annual Congressional decision, such as is now provided by action on appropriations, will provide an appropriate method of seeing to it that such a periodic review is in fact made. Any

Adm. Ramsey to AIA Presidency

Veteran Naval aviator, a pilot since 1916 and former BuAer head, named to succeed Gen. Echols on July 1.

Adm. DeWitt Clinton (Duke) Ramsey, 61, will succeed Maj. Gen. Oliver P. Echols as president of the Aircraft Industries Assn. on July 1, AIA announced last week. Ramsey is now commander of all U. S. forces in the Pacific and governor of the Pacific Islands administered by the Navy.

Ramsey's retirement from the Navy, effective May 1, was accepted by the President last week. His new post was disclosed officially shortly thereafter. Since Echol's resignation as AIA president a few months ago, Capt. Leland D. Webb (USN, ret.) has been acting president.

▶ **Early Pilot**—Admiral Ramsey has one of the longest and most distinguished careers in Naval Aviation. He was the 45th man to be commissioned a Naval aviator. His aircraft carrier experience stretches from the Langley and Wright, the earliest aircraft carriers, to the command of the most modern carriers in the fast task forces of the Pacific war.

He was appointed to Annapolis from New York in 1908 and took flight training at Pensacola in 1916. He served with the Naval Air Service in France during the first World War and was later Asst. Naval Attache for Air in London. He returned to the United States for carrier duty aboard the Wright with Torpedo Bomber Squadron No. 1.

▶ **Plans Chief**—Ramsey became chief of the plans division of the Bureau of Aeronautics in the critical summer of 1941 and asst. chief of the bureau in May, 1942. He commanded the Saratoga in the initial air assaults on the Japanese islands in the Pacific, including air support of the Marines' landing on Guadalcanal in August, 1942. Later he commanded a carrier task force which included the first British carrier to operate with the U. S. Fleet. He served as chief of the Bureau of Aeronautics from August, 1943, to June, 1945, when he became chief of staff to Admiral Spruance, then commander of the Fifth Fleet in the Pacific. After the Japanese war he became deputy commander in chief of the U. S. Pacific Fleet.

▶ **Won Navy Cross**—Returning to Washington in January, 1946, Admiral Ramsey was named vice-chief of naval operations and served in that capacity until the middle of 1948 when he returned to the Pacific to command all U. S. forces in that theater including the Pacific Fleet.

His permanent home is at Avon by the Sea, New Jersey. Admiral Ramsey won the Navy Cross for his carrier task force operations in the Pacific and the Distinguished Service Medal for his wartime tenure as chief of the Bureau of Aeronautics.

figure set in permanent law, be it large or small, would be meaningless and misleading to many persons, as it would almost certainly be too small or too large in any given year, in comparison to the amount of procurement then determined to be proper and necessary."

• **Research and Development.** Budget Bureau urged that the blanket authority for long-range USAF research and development programs be eliminated. The General Accounting Office has ruled that military appropriations not obligated during the year for which they are made or expended within three years must revert to the Treasury. Budget Bureau's Director Frank Pace argued that the availability of funds for each project should be specifically provided for. He said: "A legislative provision fixing the availability of appropriations is not necessary. It would be possible to achieve the same result by inserting the necessary provisions into the language of the various appropriations involved."

PAA, Grace Buy 48% of NAL Stock

A stock sale and equipment interchange agreement concluded last week gave Pan American Airways and W. R. Grace & Co. virtual control of National Airlines, subject to Civil Aeronautics Board approval.

Under the agreement, Pan Am would gain the additional, long-sought right for its planes to operate from New York to Miami over NAL's routes. Aircraft of Pan American-Grace Airways, also a party to the pact, could be operated over National's routes from Miami to Washington and New York.

The agreement was to be filed for CAB approval late last week. If approved, the four companies believe, it would accomplish the purpose of the Board's present investigation of National's route structure. Additionally, it would give through-plane service from northeastern U. S. to South America.

The agreement, signed by the four companies last week in Washington, is a modification of an earlier proposal by National to the Grace company (AVIATION WEEK, Mar. 14). Under it, PAA acquires a 30 percent stock interest in NAL, and Grace 18 percent.

► **$4 Million**—No figures on amount of money or number of shares involved was included in last week's announcement. But at the time the previous proposal was disclosed, it was understood that National was selling a total of 692,000 shares of stock to PAA and Grace and that at the indicated book value this would give NAL an additional $4 million in new capital. The 692,000 shares would result in joint PAA-Grace holdings of 48 percent, the proportion now officially announced.

RAF's Expansion Plan Disclosed

New jet night fighters to replace Mosquitos, twin-jet bomber near, jet fighter strength to be doubled.

By Frederick R. Brewster

(McGraw-Hill World News)

LONDON—Britain's Royal Air Force is in the midst of an expansion program aimed at filling present gaps in its arsenal of air weapons and adding substantially to its plane strength.

Salient features of the RAF program:

• **New twin-jet night fighter** (still on the secret list) has been ordered into quantity production as a replacement for the de Havilland piston engine Mosquito, now the standard RAF night fighter.

• **New twin-jet medium bomber** will go into quantity production at the English Electric Co. plant at Preston. Prototype will be flying this summer and is expected to be in the 500 mph. class.

• **Doubling of RAF jet fighter** production. Increased production will be absorbed by equipping RAF overseas squadrons with jet fighter, increasing plane strength of jet squadrons based in England; and equipping RAF reserve squadrons with jet fighters.

• **Increase of the RAF budget to $828 million** for the fiscal year from Apr. 1, 1949 to Mar. 31, 1950. This compares with approximately $756 million for last year. RAF last year spent $184 million for new aircraft compared with an estimated $200 million for the next fiscal year.

The new jet bomber to be built by English Electric Co. is regarded as an interim project to fill the gap between present piston engine Lincolns plus any Boeing B-29s that may be acquired under the North Atlantic Pact provisions and a series of advanced jet bomber projects now in the design stage at the Bristol and Handley-Page plants.

► **Jet Policy**—Secretary of State for Air, Arthur Henderson recently told the House of Commons that the RAF had deferred conversion to jet bomber types until advanced models of British jet engines had been thoroughly tested, apparently on the assumption that it would be easier to catch up in airframe design than in jet engine development.

"At the end of the war we had two alternatives," Henderson told Commons. "We could have developed at great cost a type of jet bomber built around existing jet engines. Or we could have gone in for development of another piston engine type larger, heavier, and more costly than the Lincoln.

► **British Decision** — "Either course would have produced at great cost a bomber of only limited and very temporary value which would have become obsolete in a relatively short space of time. Development of such aircraft would have made demands on our limited technical resources which would have led to further delay in producing a really advanced type.

"It was therefore decided (and this was at a time when the international situation was viewed in a different light than today and when military expenditures had to be cut to a minimum) in the interests of national recovery, to concentrate on a long-term development of advanced jet bombers."

Henderson said the program for doubling strength of day-fighter squadrons in Britain and equipping overseas RAF squadrons with jet planes would be completed by June of 1950. Henderson said the following additional aircraft types are now coming into operational service with the RAF: Valetta, medium transport which is a DC-3 replacement; Hastings long range transport replacing the York; and the Shackleton, long range Coastal Command reconnaissance bomber. Henderson indicated that the latest type Meteor and Vampire jet fighters would be replaced by a new generation of high speed jet fighters of vastly improved performance that are now in the development stage.

Aircraft Shipments

Personal aircraft shipments reported by 10 manufacturers for February showed production up about 50 percent over January with 226 shipments worth $1,018,000 compared to 152 shipments worth $864,000 during the preceding month.

Four-place models continued to lead two-place types by a 2-to-1 ratio with 153 four-place shipments compared to 73 two-place aircraft.

Piper continued to lead with 72 deliveries as against 59 for Cessna, second-place producer for the month. Aeronca shipped 23 and Luscombe delivered 21 aircraft.

Ryan shipped 21 Navions and Beech moved 14 Bonanzas. Other deliveries included seven Bellanca Cruisairs, five Ercoupes, two Taylorcrafts and two TEMCO Swifts.

Aircraft Firms Reporting Profits

Six of eight manufacturers show earnings in annual statements, with only Convair and Martin in red.

Substantial military sales boosted six out of eight aircraft manufacturing firms into the black for the fiscal year 1948, according to annual reports released recently.

Companies reporting profits for last year include United Aircraft Corp.; Curtiss-Wright Corp.; Douglas Aircraft Co.; Lockheed Aircraft Corp.; Republic Aviation Corp.; Grumman Aircraft Engineering Corp. Glenn L. Martin Co. and the Consolidated Vultee Aircraft Corp. reported losses. However, Convair's 1948 loss was brightened by a first quarter report for the current fiscal year showing a net profit of $987,284, the first profitable operations since the end of wartime production.

Details by companies:

Lockheed

Profits of $6,239,380 were reported for 1948 by Lockheed Aircraft Corp. Sales, including wholly-owned subsidiaries, totalled $125,620,700 (75 percent military). Lockheed backlog at the end of 1948 was $195,101,000 of which 93 percent was military.

Lockheed backlog includes: 110 F-94 night fighters; 567 F-80C jet fighters; 136 TF-80C, two-seater jet trainers; 107 P2V series patrol bombers; 20 Constellations for commercial and military operators and one Constitution scheduled for delivery to the Navy sometime next summer.

Lockheed received net income of $1,300,000 from its wholly-owned subsidiaries: Lockheed Air Terminal; Lockheed Aircraft Service Corp.; and Air-equipment Corp. in addition to its holdings in the Pacific Finance Corp.

Dividend payments were resumed during 1948 for the first time since 1946 with payment of $1.50 per share during 1948 and an additional 50 cents per share in March 1949.

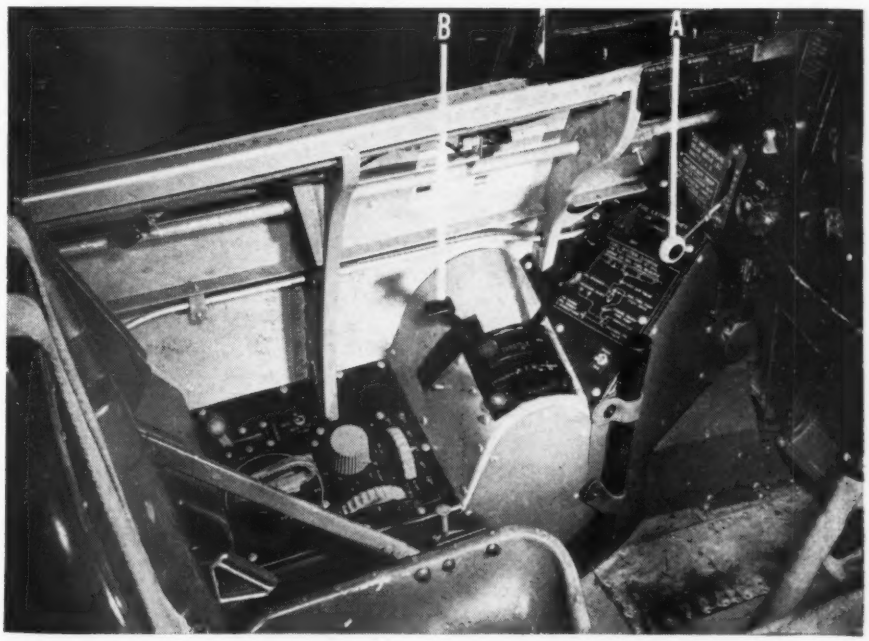
Convair

Convair's net loss of $11,978,795 for the fiscal year ending Nov. 30, 1948 was considerably higher than anticipated earlier due to heavy write-offs on the Convair-Liner ($800,000) and Stinson personal plane inventories ($521,000). Convair also reported that $750,000 in fees on B-36 production anticipated for fiscal 1948 were not received until the current fiscal year.

During the year Convair reported sales of $112 million of which $82 million were to the U. S. Air Force; $5.3 million to the Navy (largely guided missiles); and $20.2 million on the Convair-Liner. Convair delivered 100 planes of which 92 were Convair-Liners; 900 Stinson personal planes; and the balance L-13 liaison planes and B-36 bombers for the USAF.

▶ **Backlog $156 Million**—Backlog of $156 million was reported at the close of the fiscal year almost entirely in military business ($119 USAF and $18 million Navy). This does not include the recent Convair order for 39 additional B-36 bombers and modifications on previously ordered B-36s, which boosted the backlog by $86 million.

Board Chairman Floyd B. Odlum reported that Convair has now absorbed all expected losses on the Convair-Liner program including an unexpected $1,430,000 in completing 178 of the transports and had made a profit of $987,284



FAIRCHILD GETS TRAINER ORDER

Fairchild Engine & Airplane Co. will build 100 T-31 basic trainers (shown above) for the U. S. Air Force at its Hagerstown, Md. plant. Contract is in excess of $8 million. Full scale production is scheduled for the end of 1949 with USAF cadets scheduled to begin flying the T-31 early in 1950. T-31 was originally developed for the Navy as the XNQ-1 and features a standardized USAF-Navy cockpit (below) in which landing gear lever (a) has a miniature wheel knob. Flap control (b) has a miniature airfoil knob to avoid confusion between these oft-confused controls. The Fairchild trainer has a span of 41 ft.; length of 28 ft. and is powered by a 300 hp. Lycoming engine. Gross weight is 3750 lb.; top speed 160 mph.; service ceiling, 19,000 ft.; and stalling speed at sea level with flaps up about 60 mph.

for the first quarter of fiscal 1949 on sales of $50,186,194. Convair's backlog at the end of the quarter was $190 million including the additional B-36 order.

Odlum disclosed that the Stinson division was sold to Piper Aircraft Corp. for 100,000 shares of Piper stock and that Piper expects to sell the remaining inventory of Stinson planes by this summer. The Stinson plant at Wayne, Mich., will be sold by Convair.

Curtiss-Wright

Curtiss-Wright Corp. reported a net profit of $5.3 million on sales of $111,747,027 for 1948. This compares with a net loss of $1,365,258 on sales of $83,161,988 in 1947. The corporation reported a backlog of $142 million in unfilled orders as of Feb. 28, 1949. C-W President Wm. C. Jordan indicated the corporation is placing its main emphasis on the engine and propeller division.

Wright Aeronautical Corp. is pushing development of turboprop, compound, turbojet, ramjet and piston engines with the propeller division working on rocket engines for the military. Engines sales are about 65 percent military. Biggest engine sales in 1948 were on the 2500-2700 hp. Cyclone 18 engine used on the Lockheed P2V Navy bomber and Constellation transport and the Douglas Skyraider Navy attack plane series. Propeller division is now furnishing more than half of the total propellers used in military and commercial aircraft.

The corporation paid dividends totalling $16,768,002 on class A and common stock during 1948. Two dividends of $1 each were paid on common stock with one $2 dividend on class A stock. On Feb. 25, 1949 directors declared a dividend of $2 per share on a stock to be paid in quarterly installments during 1949. A regular quarterly dividend of 25 cents was also declared on common stock. Directors announced that the corporation intended to pay $1 per share on common stock during 1949.

Douglas

Net profit of $5,829,206 (4.9 percent of sales) was reported by Douglas Aircraft Co. for the fiscal year ending Nov. 30, 1948. Sales for the year were $118,581,847, about $10 million below the 1947 level. Company backlog was $232,989,000, an increase of approximately $81 million over the previous year. USAF accounted for 43 percent of the backlog (principally for C-124A transports) with 54 percent in Navy orders for the Skyraider attack plane series and the Skynight (F3D) jet night fighter. Douglas reported $26 million in sales of spare parts to airlines and the military.

Cash dividends of $5 per share were distributed to stockholders of record Nov. 3, 1948 with a quarterly dividend of $1.25 per share declared on Feb. 16, 1949 in addition to a special dividend of $2.75 per share.

Employment at Douglas' three plants has risen from a postwar low of 13,500 last July to 16,000. Bulk of Douglas production (Skyraider and Skynight) is now at the El Segundo plant with the C-124A work being done at Long Beach. Santa Monica plant is doing fabrication work for El Segundo and development of the DC-6A freighter which is expected to fly early this summer.

Martin

Loss of $16,710,762 was reported by the Glenn L. Martin Co. for its 1948 operations. Martin had sales of $72,686,572 for 1948 of which $66,517,149 represented military business. Backlog of unfilled orders stood at $88,097,141 as of Dec. 31, 1948.

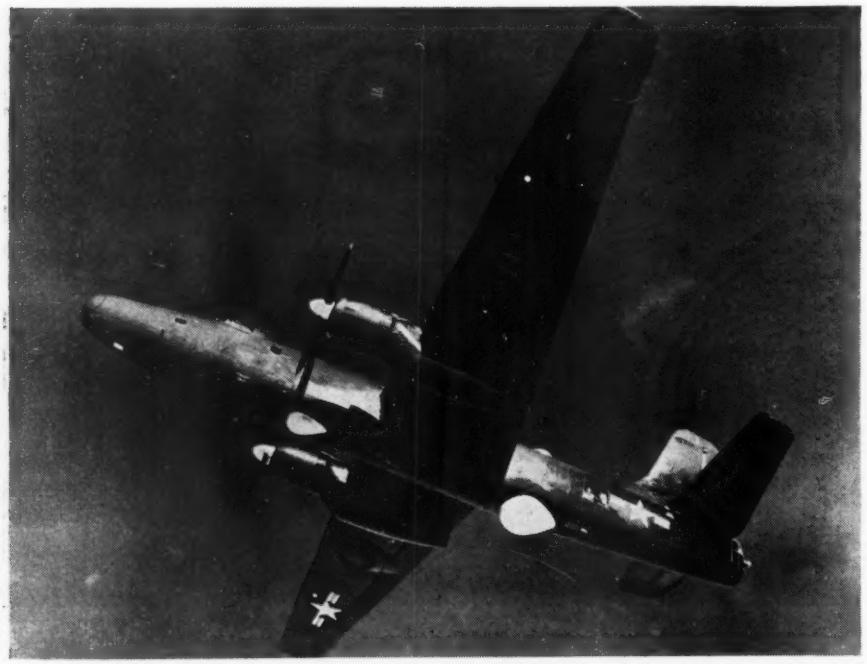
The Martin Co. reported a profit on military business that was more than offset by losses on the commercial Model 2-0-2 transport program and the chemical division. The firm has established a valuation reserve of $12,750,000 to reduce 2-0-2 inventories to their estimated realizable value. The sales possibilities of the 2-0-2 cannot be expected to improve until the cash and credit position of the domestic airlines and dollar exchange availabilities of foreign airlines improve, the company believes.

The 2-0-2 assembly line has been shut down until new orders are received. Another reserve of $2,800,000 has been established to cover estimated costs of modifications to existing 2-0-2s. Martin's remaining balance on its RFC loans is $16,372,521 which is scheduled for repayment as follows: $2,867,500 before Sept. 30; $2,800,000 before Jan. 15, 1950; 2,030,500 before Mar. 31, 1950 and the balance before Sept. 30, 1950.

Republic

One of the most spectacular of last year's comebacks was staged by Republic Aviation Corp. It not only turned in a profit for the first time since 1945, but virtually doubled its working capital, wiped out its indebtedness to banks and managed to dispose of a losing subsidiary at a profit.

On sales of $49,816,986, Republic had an operating profit of $2,827,394.



NEW VIEW OF MERCATOR

Second experimental model Martin P4M-1 Mercator Navy anti-submarine search plane is shown in test flight over Baltimore plant. Model features redesigned tail surfaces to accommodate thermal deicing leading edge installation. Power-driven cannon turret installed in nose replaces previous installation of test equipment. Although two P&W Wasp Major engines give Mercator appearance of twin-engine design, an Allison J-33 turbojet engine is buried in each nacelle to provide thrust for takeoff, rapid climb and high speed acceleration during tactical maneuvers. Schedule calls for 24 Mercators to be delivered to Navy during year. P4M has 114-ft. span, is 85 ft. long and carries a normal crew of nine men. It has a gross weight of 40 tons.

Federal taxes took $1,036,827 of this, but the company was eligible to carry forward against 1948 tax liability part of its 1947 operating loss. Result was a net profit of $2,196,475.

▶ **Working Capital**—At the end of 1947, Republic's working capital was down to $3,438,538 (which included $1,923,970 cash), indicating the extent to which the Seabee project had siphoned off the company's assets. As of Dec. 31, 1947, Republic also owed banks $3,217,000, drawn on a $5.7 million line of credit.

Here's how that picture has changed: As of Dec. 31, 1948, Republic had working capital of $6,873,415 (including $3,163,514 cash). It had liquidated its bank loans, and had not borrowed since April, 1948. Although in December it renewed the line of credit, this time for $5 million, nothing had been drawn down as of the end of the year.

▶ **Sale Profit**—Republic bought Aircooled Motors, Inc., manufacturers of Franklin engines for light aircraft, in order to establish a source of supply for Seabee power plants. When Aircooled was sold for $1.8 million last year, Republic had put into it $2,831,112, most of which was charged against a reserve built up to cover Aircooled's losses. Result was income from the sale amounting to $156,661.

In 1948 Republic restored to earned surplus the balance of its postwar contingency reserve, amounting to $3,253,320. This, plus last year's profit, brought earned surplus since 1939 up to $6,401,242, as against $895,162 as of Dec. 31, 1947.

Employing 6000, Republic is working on F-84 orders that have aggregated about 1000 planes, the annual reports states. Backlog of approximately $52 million as of Mar. 1, 1949, will carry production into 1950.

Grumman

Grumman Aircraft Engineering Corp. will make deliveries later this year of the first production models of its TB3F Guardian, Navy anti-Submarine plane, the company's annual reports reveals. Two prototype Guardans are flying, one being equipped with an oversized radar housing under the belly of the midwing craft. An order for a "limited quantity" has been placed by the Navy.

Grumman also has completed design of a "successor to the Panther" presumably the XF10F—and it is being made ready for prototype construction. First production Panthers—F9Fs—were delivered late in 1948, the report states, and production will accelerate this year until it replaces work on the F8F as Grumman's major project. The F8F contract is scheduled for completion the middle of this year.

▶ **Widgeon Dropped**—These Navy planes, plus the SA-16 Albatross for the Air Force, constitute nearly all of Grumman's aircraft work. Regarding the company's commercial airplanes, the report states merely that sales of the Mallard amphibian "continued" in 1948. The smaller, four-place Widgeon, however, has been discontinued, last of the planes being disposed of in 1948.

Grumman's non-aircraft work, aluminum canoes, dinghys and truck bodies, continued, the truck body business alone bringing in $1.5 million. But the non-aeronautical products combined yielded only about 4 percent of Grumman's total business.

▶ **Still Profitable**—Grumman continued an unbroken record of profits last year, netting $2,393,311 on total income of $41,207,124. These are the highest figures since 1945. Working capital amounted to $20,095,373 as of Dec. 31, 1948, cash amounting to $7,153,466. Backlog of same date was $182 million.

United Aircraft

While reporting gross income of $209,125,736, slightly in excess of that for the preceding year, United Aircraft Corp. turned in a profit for 1948 nearly $400,000 less than in 1947—$9,423,718, as against $9,817,295. This was largely due to increased engineering and development costs.

Plant and facility expansion reduced company's working capital position, but still left UAC with a whopping $84,802,274 in working capital. Inventories at Dec. 31, 1948, were up to $65,653,183, compared with $60,417,834 in 1947, but about $24 million of this figure was in connection with government contracts.

▶ **Expansion**—UAC's expansion activities dominate the annual report. By the end of this year it is anticipated that a $20 million improvement and expansion program will be completed.

As of Dec. 31, 1948, about $7.5 million had been spent on Pratt & Whitney's turbine laboratory; Hamilton Standard had added 22,500 sq. ft. of floor space to its plant; Sikorsky had added 100,000 sq. ft., and the mammoth job of moving Chance Vought to Dallas had been half finished.

The Dallas move is expected to be completed by July 1, and the Stratford plant then probably will be sold. It is a "scrambled" facility, with the government owning about 75 percent, and UAC already has started discussions with the government to pave the way for the sale.

United still has a reserve of $5.9 million to cover plant expansion, etc., after charging this account last year with $1.6 million on the Dallas move. The corporation anticipates that the reserve will be exhausted by the end of this year.

▶ **Fruits of Experiment**—The report indicates that some of the heavy experimental expenditures run up by UAC since the end of the war are paying off. The JT6 Turbo-Wasp (licensed by Rolls-Royce to P&W, which has made many engineering changes) completed its 150-hr. qualifications test at a static thrust rating of 5000 lb. Deliveries began in November. In addition, P&W now has on the test stand "complete units" of its own gas turbine engines.

In the Sikorsky division, the all-metal rotor blade for helicopters has been brought along to the point where it is ready for limited production. And during the year Hamilton Standard increased by 50 percent its production of hollow steel propeller blades.

United Aircraft had 25,481 employes on its payroll at the end of the year, working on a backlog totaling $335 million.

Family Fare Plan Extended to June 30

Civil Aeronautics Board has granted to 17 domestic carriers approval for extension of first-of-the-week family fares until June 30.

Whether the carriers will ask for or whether CAB will grant further extensions of the family fare plan through the summer is still in doubt. Some lines are not sure that the special tariff has resulted in a net revenue gain. Degree to which regular-fare business has been diverted to the family plan is still being studied by the operators and CAB.

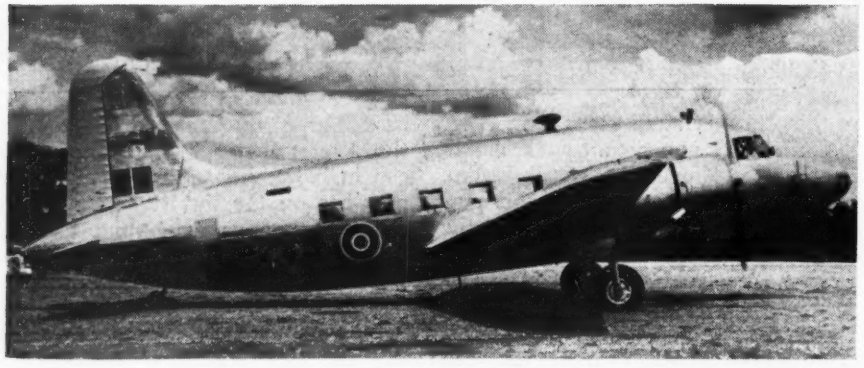
▶ **Traffic Level Constant**—But the carriers are in agreement that the plan has been a success in keeping traffic levels fairly constant throughout the week by eliminating the normal Monday-Tuesday-Wednesday dip. Further, the plan's promotional benefits appear to be substantial, with all members of the family group becoming users of air transportation. The carriers believe a half-fare customer in a family today may be an individual full-fare rider tomorrow.

Mid-Continent Airlines has reported that for the 13-week period ended Feb. 27 one of every eight passengers carried during the first three days of the week traveled under the family fare plan. Average daily passenger mileage flown by MCA on Mondays, Tuesdays and Wednesdays now exceeds the daily average for the latter part of the week, when traffic formerly was heaviest.

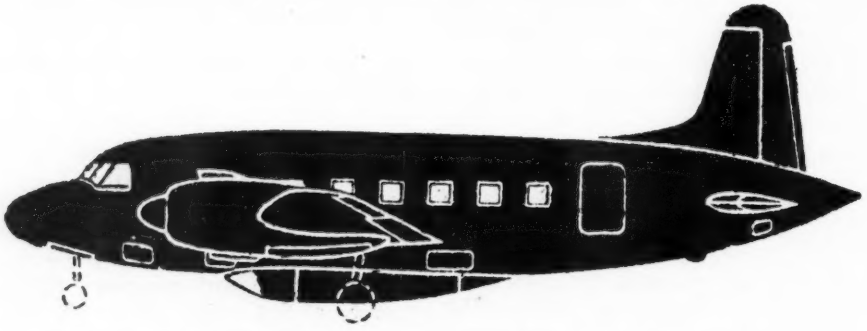
Average passenger trip made by family plan customers over MCA routes increased from 316 to 400 miles in the 13-week period, while the average for regular passengers remained at about 300 miles.

DETROIT PUBLIC LIBRARY

AVIATION WORLD NEWS



BASIC DESIGN of British Vickers Viking and Valetta has been adapted to . . .



. . . BOMBER TRAINER with tricycle gear, external bomb bay and longer nose.

New Bomber Trainer for Britain

LONDON—A new lease on life for the basic design of the Vickers-Armstrong Viking twin-engine civil transport is contemplated in the latest version of the plane: a bomber trainer for the RAF. It will have more advanced performance than the present bomber trainer adaptation of the Vickers Wellington.

External details have just been released and while no order for the production of the plane has been placed, it is probable that such an order will follow when Vickers-Armstrongs' Weybridge works winds up its present production of some 250 Valetta military transports for RAF Transport Command—about mid-summer of this year.

Chances of further commercial sales of the Viking have diminished, at least in the European area. Danish Airlines (DDL) have put their remaining four Vikings up for sale, following the example set some months ago by Aer Lingus.

Aer Lingus' decision reflected the improvement in the supply situation of DC-3 spare parts and the airline's desire to simplify its maintenance problem by standardizing on the Douglas plane. But the sale of the Vikings, and DDL's decision to sell, naturally, affects the Viking's reputation.

▶ **Genealogy**—The new plane, designated the T. 1 by the Ministry of Supply and Type 648 by Vickers, is a straightforward conversion of the standard Valetta, which was developed from the Viking. The latter was a postwar quick-change and drew many structural features, including its wing, from the Wellington bomber.

The plane is powered by two Bristol Hercules engines driving fully feathering, hydraulically operated, four-bladed airscrews. It is primarily intended for day and night training of aircrew personnel and is fully provided with the most up-to-date equipment for this function.

Most noticeable new feature is the tricycle undercarriage. All units are twin-wheeled with a Vickers single central oleo strut, and all fold forward on retraction. The wheelbase is 18 ft. 1 in. and the overall height of the aircraft on the ground is 12 ft. 9 in. (7.2 m.). The hydraulic nosewheel steering and the mechanically operated undercarriage doors are similar to Viscount design. Vickers' first big plane with tricycle gear.

▶ **Bomb Bay**—Main fuselage difference is the underslung bomb bay with a bomb aimer's window. The tail cone which was cut away for the glider towing role of the Valetta has been refitted in the new trainer. The overall length is now 67 ft. 6 in.

The wing, with an area of 970 sq. ft. has a slightly greater span—94 ft. 11 in.—but is of similar construction to that of the Valetta. An entirely new nacelle and engine cowling are fitted, intended to provide easy maintenance. Valetta-type split flaps of increased area are installed; the tail unit, controls and most other features are virtually the same as on the Valetta.

State Takes Control Of Aerovias Brasil

RIO DE JANEIRO—Aerovias Brasil, which flies routes throughout this country and to the U. S., has been taken over by VASP (Viacao Aerea Sao Paulo), the line of the state government of Sao Paulo.

Marcelo Ulysses Rodriguez, now VASP president, also is president of Aerovias. VASP acquired 82 percent of Aerovias' stock for an announced price of 25 million cruzeiros (about $1,250,000). Aerovias owns more than 20 DC-3s and C-54s, as well as other equipment and installations.

▶ **Once Run By TWA**—Started during the war, essentially to haul strategic minerals to the U. S., Aerovias Brasil was at one time run by TACA and later by TWA, before some Brazilian businessmen acquired control. It was generally considered the third most important Brazilian line, after Panair do Brasil and Cruzeiro do Sul, but like many others in the over-crowded field it had suffered serious financial difficulties.

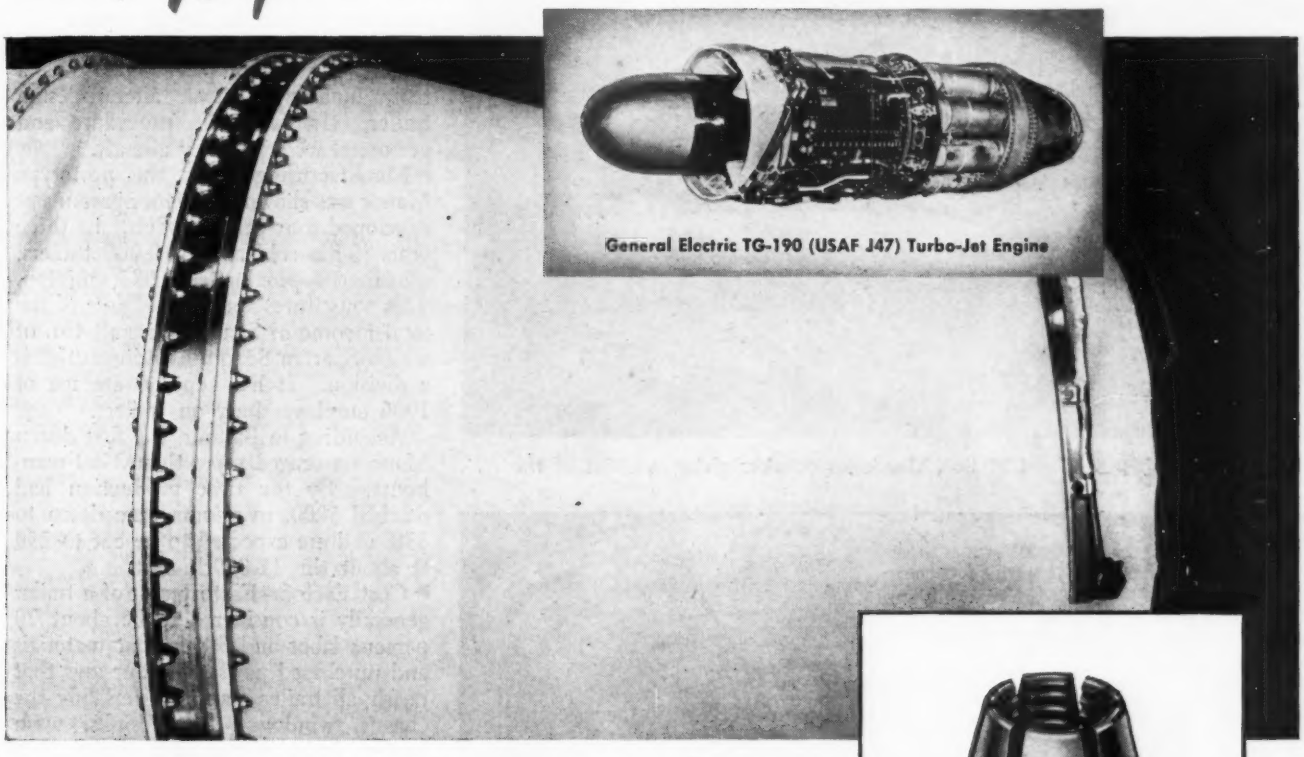
VASP, which consistently shows a profit, hopes to put Aerovias into the black by reducing overhead in the merger. VASP hitherto has confined itself to southern Brazil, especially the lucrative Rio de Janeiro-Sao Paulo transport operation.

Presumably Aerovias' two-engine plane service to Miami will continue. Cruzeiro do Sul is the other Brazilian airline authorized to operate to the United States, with Pan American and Braniff as the two American lines in the U. S.-Brazil service.

GM Interest Bought

MELBOURNE—Rolls-Royce, Ltd., British engine manufacturer, has bought General Motors' interest in Commonwealth Aircraft Corp. General Motors-Holden, GM's Australian subsidiary, held 70,000 shares in the $4 million aircraft concern.

NEW! *High-Temp Nut* HOLDS WITHOUT SEIZURE AT 1200°F.



General Electric TG-190 (USAF J47) Turbo-Jet Engine

HIGH TEMPERATURE NUTS
HEX AND ANCHOR—FOR 1200°F
(Esna Type Z-1200)

Stainless Steel type 18-8 Columbium stabilized, silver plated, the new ESNA Z-1200 nuts will NOT seize the bolt or gall the finish. Vibration, impact or stress reversal will not disturb their pre-stressed or positioned settings.

THEY ARE RE-USABLE

Self-locking Elastic Deflection protects against VIBRATION! *permits* INTERCHANGEABILITY!

The extreme heat generated in exhaust manifold systems, turbo-jet tail cones and similar installations create strength and seizure problems in ordinary fasteners—problems that are solved by ESNA's NEW Z-1200 Hex and Anchor Nuts.

These new nuts shown above on the tail cone flanges of the General Electric TG-190 retain their strength and locking torque characteristics even after repeated use at 1200°F. They are readily removed . . . do not seize the bolt or damage the threads.

Further, the elastic deflection built into the Z-1200's locking-beams makes them re-usable—interchangeably . . . because exact design assures locking torque within the tolerance range of Class 3 bolts.

ESNA Z-1200 Nuts—like all Elastic Stop Nuts—are designed for rapid field service replacements to simplify maintenance. They are self-locking anywhere on a bolt or stud without frictional aid from bolt tension or seat pressure.

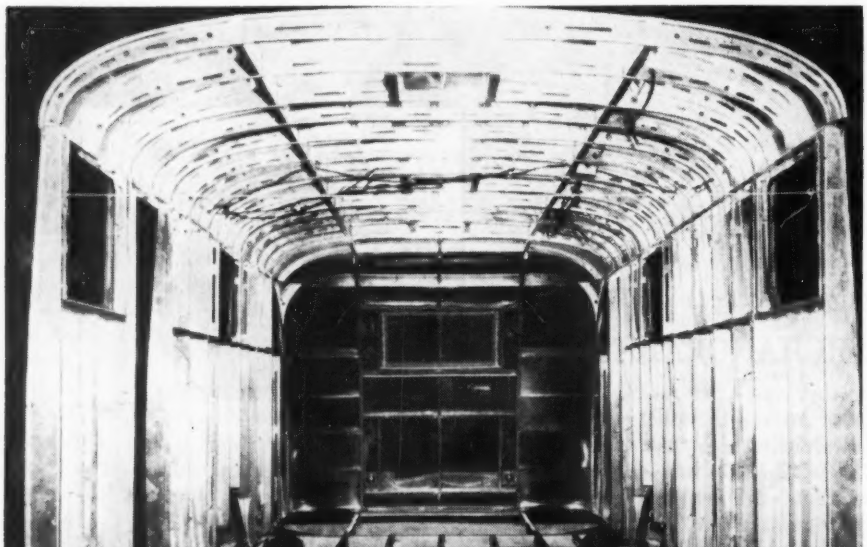
HERE'S A CHALLENGE. Send us complete details of your toughest bolted trouble spot. We'll supply test nuts—FREE, in experimental quantities. Or, if you want further information, write for literature.

Elastic Stop Nut Corporation of America, Union, New Jersey. Representatives and Agents are located in many principal cities.

ELASTIC STOP NUTS

OVER 450 TYPES AND SIZES IMMEDIATELY AVAILABLE FROM STOCK

TRAILER COACHES at end of line, aluminum exteriors giving no hint of the . . .



. . . RUGGED AIRCRAFT construction that gives the bodies unusual strength.

Trailer Coaches by Spartan Aircraft

Spartan Aircraft Co. is keeping its manufacturing plant busy and is helping furnish sorely-needed housing facilities through the very factors that two years ago caused most aircraft manufacturers to abandon efforts to enter the housing field.

After extensive surveys, the bulk of the manufacturers decided that plane manufacturing and housing—even prefabs—required completely different tooling and labor skills (AVIATION WEEK, Feb. 21).

Spartan's "magic key" to housing was the trailer coach which can be constructed, the Tulsa company has found, along aircraft engineering lines with a resulting product more attractive and stronger than the usual trailer coach.

▶ **Start**—Spartan had been building aircraft since 1928 and in the mid-thirties produced a popular executive-type plane. It employed 6000 on wartime aviation work. After the war it built and flew the prototype of a new executive transport and studied a new-type automobile. It built prototypes of refrigerators, deep freeze units, and investigated furnaces. It dropped all these after examining market possibilities.

Early in 1946 it turned to the trailer coach, Vice President Maxwell W. Balfour explains, because "it was thought trailers and airplanes had something in common. They should be light and strong and have a minimum of drag. They should be able to stand a storm or crash and should be easy to repair.

"Little attention was paid to existing trailers, as the company's goal was a truly modern, postwar aircraft-design trailer. In fact, the procedure and personnel were typically aircraft."

▶ **Manufacturing**—Since the prototype Manor was shown in 1946, Spartan has developed four other models. In three years it has sold about 10,000 trailers, grossing approximately $25 million. This constitutes about two-thirds of the total income of Spartan Aircraft Co. of which Spartan School of Aeronautics is a division. It has kept an average of 1000 employes busy on trailers.

According to Balfour, the first dozen Manors averaged more than 2500 manhours. By the time production had reached 5000, manhours were down to 350, and are expected to be cut to 250 at about the 12,000th unit.

▶ **Cost Factors**—Factory cost of a trailer generally is considered to be about 20 percent labor and 80 percent materials and purchased parts. Balfour says that nearly all trailer manufacturers buy the chassis, windows, vents, sinks, wash basins, beds, divans and chairs. In order to utilize its large factory, Spartan makes everything except parts of the running gear.

Disadvantage of this is that it adds about 70 manhours per trailer to Spartan's product. This, plus higher overhead, and higher materials cost (aluminum vs. wood) puts Spartan's costs above those of the average trailer manufacturer. The company did not reach the break-even point on the project until it reached the 5000 mark.

Although Spartan coaches cost about $500 more than most other makes, the company has captured an important percentage of the trailer market because of higher quality. In the first quarter of 1949, Spartan is doing at least twice as much business as in the same period a year ago.

Spartan is in the trailer coach business to stay. Owner and President J. Paul Getty, firmly behind the project from the start, has put new capital into the enterprise and expanded factory space. But the company has not abandoned aircraft. When and if the market is right, the executive plane will be produced—and if circumstances demanded it, the entire factory could be turned back to aircraft manufacture within 48 hours.

Invitations and Awards to Industry by USAF

Air Materiel Command Procurement Division makes available to AVIATION WEEK the latest bid invitations and awards, shown on these pages. Requests for further information should be addressed to Contracting Officer, AMC, Wright-Patterson AFB, Dayton, Ohio, attention: MCPPSX72.

ABSTRACTS

For cement (49-933):
Companies sharing—Meyercord Co., Chicago, Ill., on a bid of $16,224; Presstite Engineering Co., St. Louis, Mo., on a bid of $986.40, and Minnesota Mining & Manufacturing Co., Detroit, Mich., on a bid of $52,185,72.

For 2739 aircraft clocks (49-130):
Longines Wittnauer Co., Inc., New York, N. Y., on a bid of $49,805.88.

For 200 actuator assemblies (49-513):
Jack & Heintz Precision Industries, Inc., Cleveland, O., on a bid of $105,240.

For 9308 lb. brass (49-837):
Scoville Manufacturing Co., Waterbury, Conn., on a bid of $15,591.56.

For printing & binding services (49-885):
Art Guild Binding, Inc., Cincinnati, O., on a bid of $6000.

For 288 indicators (49-900):
Weston Electrical Instrument Corp., Newark, N. J., on a bid of $25,291.20.

For photographic paper (49-1052):
Haloid Co., Rochester, N. Y., on a bid of $3272.

For 150 jewelers' lathes (49-1063):
Hamel, Ringlander & Co., Inc., New York, N. Y., on a bid of $18,037.50.

For 8 test stands (49-1075):
Greer Hydraulics, Inc., Brooklyn, N. Y., on a bid of $39,984.

For fibre rod (49-714):
National Vulcanized Fibre Co., Wilmington, Del., on a bid of $3993.92.

For 1870 gasoline cans (49-786):
Protectoseal Co., Chicago, Ill., on a bid of $16,880.10.

For 1000 cable assemblies (49-775):
Mines Equipment Co., St. Louis, Mo., on a bid of $42,800.

For 600 indicators (49-783):
Kollsman Instrument division, Elmhurst, N. Y., on a bid of $43,805.36.

For 200 loudspeakers (49-920):
Hallicrafters Co., Chicago, Ill., on a bid of $8182.50.

For 69 flashing device mounts (49-924):
Aeroflex Laboratories Inc., Long Island, N. Y., on a bid of $15,318.

For flexible shielded conduits (49-928):
Chicago Metal Hose Corp., Maywood, Ill., on a bid of $22,040.45.

For cotton tape (49-966):
Companies sharing—Hope Webbing Co., Providence, R. I., on a bid of $1754; Hamilton Web Co., Hamilton, R. I., on a bid of $887.40; American Cord & Webbing Co., Inc., New York, N. Y., on a bid of $4557.60, and Southern Weaving Co., Greenville, S. C., on a bid of $1138.50.

For photographic chemicals (49-976):
Companies sharing — Octagon Process Inc., Brooklyn, N. Y., on a bid of $18,213; Eastman Kodak Co., Rochester, N. Y., on a bid of $20,610; Industrial Distributors, Inc., New York, N. Y., on a bid of $3748, and Philip A. Hunt Co., Brooklyn, N. Y., on a bid of $4570.

For 1960 capacitors (49-1043):
Companies sharing — Sangamo Electric Co., Springfield, Ill., on a bid of $652.20; Aerovox Corporation, New Bedford, Mass., on a bid of $917.84; Tobe Deutschmann Corp., Norwood, Mass., on a bid of $993.80, and Condenser Products Co., Chicago, Ill., on a bid of $216.

For 9900 rolls of cotton twine (49-1011):
Independent Cordage Co., Inc., New York, N. Y., on a bid of $5871.50.

For belts (49-627):
Companies sharing — Michigan Bolt & Nut Co., Inc., Detroit, Mich. on a bid of $9111.89; Detroit Bolt & Nut Co., Detroit, Mich., on a bid of $156.09; Atlas Bolt & Screw Co., Cleveland, Ohio, on a bid of $2209.56, and Reliable Metal Novelty Co., Inc., Mount Vernon, New York, on a bid of $1075.

For 250,000 humidity indicators (IFB 49-702):
Davidson Chemical Corp., Baltimore, Md., on a bid of $13,625.

For 228,100 grommets (IFB 49-703):
Edwin B. Stimson Co., Inc., Brooklyn, N. Y., on a bid of $1048.63.

For 1,740 ft. phenolic rod (IFB 49-715):
Mica Insulator Co., Schenectady, N. Y., on a bid of $1132.48.

For 6876 resistors (IFB 49-757):
Companies sharing—Ward Leonard Electric Co., Mt. Vernon, N. Y., on a bid of $385; Midway Electric Supply Co., Inc., New York, N. Y., on a bid of $808.04 and Clarostat Mfg. Co., Inc., Brooklyn, N. Y., on a bid of $696.

For 120,000 lb. blasting grit (IFB 49-875):
Lufkin Pecan Shelling Co., Lufkin, Tex., on a bid of $4800.

For 69,100 yd. of sheeting cloth (IFB 49-762):
Companies sharing—George Wood, Sons & Co., Philadelphia, Pa., on a bid of $3020.73 and Springs Cotton Mills, Lancaster, S. C., on a bid of $22,756.30.

For 2250 light assemblies (IFB 49-796):
Grimes Mfg. Co., Urbana, O., on a bid of $2250.

For moving butane tanks (IFB 49-891):
Arthur Morgan Trucking Co., St. Louis, Mo., on a bid of $15,500.

For 30,000 threaded rivets (IFB 49-727):
Dill Mfg. Co., Cleveland, O., on a bid of $1680.

For 4596 gal. of cellulose dope (IFB 49-751):
Cook Paint & Varnish Co., North Kansas

Invitations to Bid

Bid openings are 20-30 days after approximate issue dates shown in the following bid proposals. Bid sets containing specifications for items to be procured will be sent to qualified applicants who state bid invitation number.

One bid set will be available for examination without obligations by prospective bidders, after bid publication date, at each of the seven AMC procurement field offices. This will enable firms to see specifications before writing or telegraphing for their own bid sets.

Procurement field office locations: Boston Army Base, Boston 10, Mass.; Government Aircraft Plant No. 4, Ft. Worth 1, Tex.; 39 S. LaSalle St., Chicago 3; Wright-Patterson AFB, Dayton, Ohio; West Warren and Longo Aves., Detroit 32; 155 W. Washington Blvd., Los Angeles; 67 Broad St., N. Y. 4.

Current bid proposals:

Signal Generator, 479 each, bid invitation No. 49-1538, invitation issued Mar. 23, delivery one year after award.

Resistor, 325 each, bid invitation No. 49-1539, issue date Mar. 23, delivery best possible.

Fuel Aircraft Hose, 1-19 items, bid invitation No. 49-1524, issue date, Mar. 28, delivery by July.

Flying Suit, 2827 each, bid invitation No. 49-1551, issue date Mar. 28, delivery by June 15.

Parachute Assembly, 1-6 items, bid invitation No. 49-1546, issue date Mar. 28, delivery by June 15.

Tester Assembly, 700 each, bid invitation No. 49-1541, issue date Mar. 28, delivery by July 12.

Nut, Plate Steel, 18,000 each, bid invitation No. 49-1548, issue date Mar. 28, delivery 30 days.

Transparent Tape, 3177 rolls, bid invitation No. 49-1561, issue date Mar. 28, delivery 30 days.

Pencil Sharpener-Adhesive Tape, 1-6 items, bid invitation No. 49-1560, issue date Mar. 28, delivery 30 days.

Tool Mechanics Bit-Gun Assembly, 1-3 items, bid invitation No. 49-1552, issue date Mar. 28, delivery by May 1.

Photographic Dryer, 1-10 items, bid invitation No. 49-1534, issue date Mar. 23, delivery by August 30.

Cord-Elastic Exerciser, 1-6 items, bid invitation No. 49-1549, issue date Mar. 28, delivery 60 days.

Photographic Equipment, 1-29 items, bid invitation No. 49-1483, issue date Mar. 28, delivery by Apr. 15.

Photographic Equipment, 1-5 items, bid invitation No. 49-1484, issue date Mar. 21, delivery by May 2.

Cover Gasket, 650 each, bid invitation No. 49-1514, issue date Mar. 22, delivery 60 days.

Methyl Red Dry, 864 oz. bottles, bid invitation No. 49-1519, issue date Mar. 23, delivery 30 days.

Element Oil Filter, 3300 each, bid invitation No. 49-1523, issue date Mar. 23, delivery 30 days.

Tester Inverter, 20 each, bid invitation No. 49-1531, issue date Mar. 23, delivery 60 days.

Portable Ammeter, 16 each, bid invitation No. 49-1532, issue date Mar. 23, delivery by Apr. 20.

Mercerized Cloth, 50,000 yd., bid invitation No. 49-1536, issue date Mar. 23, delivery 60 days.

Photographic Equipment, 1-22 items, bid invitation No. 49-1535, issue date Mar. 23, delivery by August 1.

Metal Shipping Cover, 1-24 items, bid invitation No. 49-1557, issue date Mar. 28, delivery 20 percent monthly.

Reflector, 1300 each, bid invitation No. 49-1545, issue date Mar. 28, delivery by May 1.

Tool Assembly, 1-24 items, bid invitation No. 49-1542, issue date Mar. 28, delivery by May 1.

Water Heater, 24 each, bid invitation No. 49-1544, issue date Mar. 28, delivery by Apr. 30.

Stand Assembly, one each, bid invitation No. 49-1581, issue date Mar. 28, delivery by July 1.

Electron Tube, 2370 each, bid invitation No. 49-1571, issue date Mar. 28, delivery best possible.

Electrical Equipment, 1-5 items, bid invitation No. 49-1533, issue date Mar. 28, delivery by Apr. 30.

Transformer, 97 each, bid invitation No. 49-1573, issue date Mar. 28, delivery best possible.

Ring Assembly, 5000 each, bid invitation No. 49-1575, issue date Mar. 28, delivery 60 days.

Screw and Washer Assembly, 600,000 each, bid invitation No. 49-1583, issue date Mar. 28, delivery 20 percent monthly.

Test Set, 44 each, bid invitation No. 49-1568, issue date Mar. 28, delivery 90 days.

Sodium Sulphite-Anhydrous, 1-4 items, bid invitation No. 49-1584, issue date Mar. 28, delivery 30 days.

Filter Element, 756 each, bid invitation No. 49-1576, issue date Mar. 28, delivery 30 days.

Sodium Sulphide Crystals, 1-4 items, bid invitation No. 49-1587, issue date Mar. 28, delivery 60 days.

(Continued from page 21)

City, Mo., on a bid of $8173.44.

For 11,545 fuel cell fittings (49-618):
Companies sharing—B. F. Goodrich Co., Akron, O., on a bid of $55,352.50; Goodyear Tire & Rubber Co., Inc., Akron, O., on a bid of $21,047.75, and U. S. Rubber Co., Mishawaka, Ind., on a bid of $3322.50.

For spray shields and floors (49-913):
Air Cruisers, Inc., Clifton, N. J., on a bid of $3760.

For 5500 sq. yd. of linoleum (49-931):
Coleman Floor Co., Chicago, Ill., on a bid of $9322.50.

For bolts and nuts (49-1024):
Companies sharing—Aluminum Co. of America, Washington, D. C., on a bid of $3294.49; Allied Screw Machine Co., Inc., Chicago, Ill., on a bid of $1994.75; The E. W. Ferry Screw Products, Inc., Beres, O., on a bid of $2109.39; Encorse Screw Machine Products, Inc., Encorse, Mich., on a bid of $259; Teleflex Inc., Philadelphia, Pa., on a bid of $2430; The Weatherhead Co., Cleveland, O., on a bid of $259.50; Heli-Coil Corp., Long Island City, N. Y. on a bid of $66; Elastic Stop Nut Corp. of America, Union, N. J., on a bid of $1963.84; Boots Aircraft Nut Corp., Stanford, Conn., on a bid of $776.40; Standard Pressed Steel Co., Jenkintown, Pa., on a bid of $599.20, and Tinnerman Products Inc., Cleveland, O., on a bid of $348.40.

For dolly assembly (49-640):
Panhandle Machine Co., Inc., Lubbock, Tex., on a bid of $42,380.90.

For 11,083 fitting assemblies (49-305):
General Electric Supply Corp., Dayton, O., on a bid of $12,868.30.

For plate printing (49-953):
Addressograph-Multigraph Corp., Atlanta, Ga., on a bid of $7661.42.

For valve assembly (49-982):
Companies sharing—Parker Appliance Co., Cleveland, O., on a bid of $17,515, and Hydro-aire, Inc., Burbank, Calif., on a bid of $8650.

For brass sheet (49-705):
American Brass Co., Waterbury, Conn., on a bid of $6621.25.

For chemicals (49-821):
Companies sharing—Cole Laboratories, Inc., Long Island City, N. Y., on a bid of $2983.50; E. I. DuPont De Nemours & Co., on a bid of $7509.38, and Washington Sales Co., Inc., Washington, D. C., on a bid of $13,408.

For screws (49-879):
Companies sharing—Reed & Prince Manufacturing Co., Worcester, Mass., on a bid of $4386.85; Lamson & Sessions Co., Cleveland, O., on a bid of $1196; Continental Screw Co., New Bedford, Mass., on a bid of $1468.72, and American Screw Co., Providence, R. I., on a bid of $9.77.

For 61,440 lb. acid (49-948):
Octagon Process Inc., Brooklyn, N. Y., on a bid of $15,331.50.

For cotter pins (49-968):
Companies sharing—American Chain & Cable Co., Inc., York, Pa., on a bid of $16,541.70, and Lamson & Sessions Co., Cleveland, O., on a bid of $54.53.

For tubing steel (49-973):
Companies sharing—Ellwood Ivins Steel Tube Works Inc., Philadelphia, Pa., on a bid of $1664.53; Tubular Service Corp., New York, N. Y. on a bid of $7411.16, and Columbia Steel & Shafting Co., Pittsburgh, Pa., on a bid of $509.50.

For helmet-welders (49-974):
Companies sharing — Harris Calorific Sales Co., Cincinnati, O., on a bid of $784; Willson Products Inc., Reading, Pa., on a bid of $10,579.68, and Dayton Safety Supply Co., Dayton, O., on a bid of $2173.48.

For 10 degreasers (49-989):
G. S. Blakeslee & Co., Cicero, Ill., on a bid of $6430.

For 400 batteries (49-1146):
Gould Industrial division, Depew, N. Y., on a bid of $24,420.

For aircraft bolts (49-1221):
Companies sharing — Aircraft Products Co., Clifton Heights, Pa., on a bid of $135; Weatherhead Co., Cleveland, O., on a bid of $205; Badgett Steam Lubricator Co., Chickasha, Okla., on a bid of $130; National Lock Co., Rockford, Ill., on a bid of $2898.66; Air Associates, Inc., Teterboro, N. J., on a bid of $2353.50; Standard Pressed Steel Co., Jenkintown, Pa., on a bid of $23,186; Aero Bolt & Screw Co., New York, N. Y., on a bid of $200; Enardo Manufacturing Co., Tulsa, Okla., on a bid of $240; Lamson & Sessions Co., Cleveland, O., on a bid of $760; E. W. Ferry Screw Products, Inc., on a bid of $1492.50; Aluminum Co. of America, Washington, D. C., on a bid of $794.98, and Kings Electronics Co., Inc., Brooklyn, N. Y., on a bid of $262.52.

For 683 batteries (49-1223):
Electric Storage Battery Co., Cleveland, O., on a bid of $53,410.60.

For 90 aircraft starters (49-1249):
Jack & Heintz Precision Industries, Inc., Cleveland, O., on a bid of $26,233.92.

For 55,200 container assemblies (49-1354):
Companies sharing—Cleveland Steel Barrel Co., Cleveland, O., on a bid of $17,152.50; Mirax Chemical Products Corp., St. Louis, Mo., on a bid of $55,879.30, and J & L Steel Barrel Co., New York, N. Y., on a bid of $18,233.

For 765 gauges (49-991):
American Machine & Metals, Inc., Sellersville, Pa., on a bid of $16,533.24.

For 5200 tubes cotton thread (49-1010):
Companies sharing—A. Lewis Thread Co., Inc., New York, N. Y., on a bid of $1065; W. Warren Thread Works Inc., New York, N. Y., on a bid of $3174, and Supreme Thread Co., New York, N. Y., on a bid of $5291.

For 2000 chamois skin (49-1037):
Companies sharing — Drueding Brothers Co., Philadephia, Pa., on a bid of $1050, and Armaly Sponge & Chamois Co., Detroit, Mich., on a bid of $1800.

For 188,592 gal. toulene primer (49-1038):
Companies sharing—The Lowe Brothers Co., Dayton, O., on a bid of $103,256.16, and Dixie Printing Ink Co., East Point, Ga., on a bid of $24,882.

For starter assembly (49-1085):
Jack & Heintz Precision Industries, Cleveland, O., on a bid of $32,968.

For 716 oil pressure gauges (49-1125):
American Machine & Metals, Inc., Sellersville, Pa., on a bid of $8617.07.

For 5625 relays (49-113):
Leach Relay Co., Los Angeles, Calif., on a bid of $67,005.

For 1325 pilots' compasses (49-175):
Airpath Instrument Co., St. Louis, Mo., on a bid of $28,785.62.

For abrasive cloth (49-881):
Companies sharing—Coogan Co., North Hollywood, Calif., on a bid of $3187.80; Atlantic Trading Co., Boston, Mass., on a bid of $2926.83; Carborundum Co., Niagara Falls, N. Y., on a bid of $8872.61; Minnesota Mining & Manufacturing Co., St. Paul, Minn., on a bid of $28,330.50; Johns Manville Sales Corp., Cleveland, O., on a bid of $10,183.30, and Philadelphia Asbestos Co., Philadelphia, Pa., on a bid of $6306.30.

For 7250 ball bearings (49-1048):
Companies sharing — Norma-Hoffman Bearing Corp., Stamford, Conn., on a bid of $319, and Marlin-Rockwell Corp., Jamestown, N. Y., on a bid of $7047.60.

For 100,000 gal. slushing compound (49-1053):
Companies sharing—W. P. Fuller & Co., Los Angeles, Calif., on a bid of $23,744, and Moran Paint Co., Dayton, O., on a bid of $85,498.

For 3 strobodynes (49-1072):
Sperry Corp., Long Island, N. Y., on a bid of $10,500.

For 70 buffer & polisher machines (49-1067):
Companies sharing — Brown-Brockmeyer Co., Dayton, O., on a bid of $1165.05, and Standard Electrical Tool Co., Cincinnati, O., on a bid of $17,850.

For 23 test stands (49-1068):
Jumbo Steel Products Co., Azusa, Calif., on a bid of $22,300.

For 425 ball bearings (49-1087):
Air Accessories, Inc., Ft. Worth, Tex., on a bid of $20,506.25.

For 54,336 lb. ammonium hydroxide (49-1264):
Miami Products & Chemical Co., Dayton, O., on a bid of $2716.80.

For 2280 ammeters (49-373):
Companies sharing—General Electric Co., Schenectady, N. Y., on a bid of $6937; Maritime Switchboard, New York, N. Y., on a bid of $825; Hickok Electrical Instrument Co., Cleveland, O., on a bid of $1230; American Machine & Metals, Inc., Sellersville, Pa., on a bid of $4543, and International Instruments, Inc., New Haven, Conn., on a bid of $1477.30.

For 58 regulator assembly (49-437):
Hevi Duty Electric Co., Milwaukee, Wisc., on a bid of $127,174.

For 8800 sq. yd. sky felt (49-930):
Seaman Paper Co., Chicago, Ill., on a bid of $31,194.50.

For 43,397 rolls adhesive tape (49-964):
Hampton Manufacturing Co., Carlstadt, N. J., on a bid of $65,462.75.

For electric indicator (49-1160):
General Electric Co., Schenectady, N. Y., on a bid of $47,639.60.

For 210 subscriptions (49-1195):
Moore-Cottrell Subscription Agencies Inc., North Cohocton, N. Y. on a bid of $3740.10.

For 97,200 machinery wiping towels (IFB 49-568):
Lamports Co., Cleveland, O., on a bid of $7698.24.

For 163,600 sq. ft. of grey wool felt (IFB 49-688):
Companies sharing—Western Felt Works, Chicago, Ill., on a bid of $68,601.15; Standard Felt Co., Alhambra, Calif., on a bid of $11,468.60 and Felters Co., Boston, Mass., on a bid of $10,393.42.

For 2,014 gals. of Cyclohexanone (IFB 49-699):
Octagon Process Inc., Brooklyn, N. Y., on a bid of $5619.06.

For 2 hardness testing machines (IFB 49-700):
Wilson Mechanical Instrument Co., New York, N. Y., on a bid of $1140.

For 4,128 gals. of paint (IFB 49-718):
A. C. & D. Corp., Chicago, Ill., on a bid of $2518.08.

PRODUCTION BRIEFING

Bell Aircraft Corp. will build the pod nacelles to be used on the Convair B-36 series. The nacelles will house two General Electric J-47 jet engines rated at 5000 lb. static thrust apiece. Boeing will build the same nacelle for the Boeing B-47 bomber.

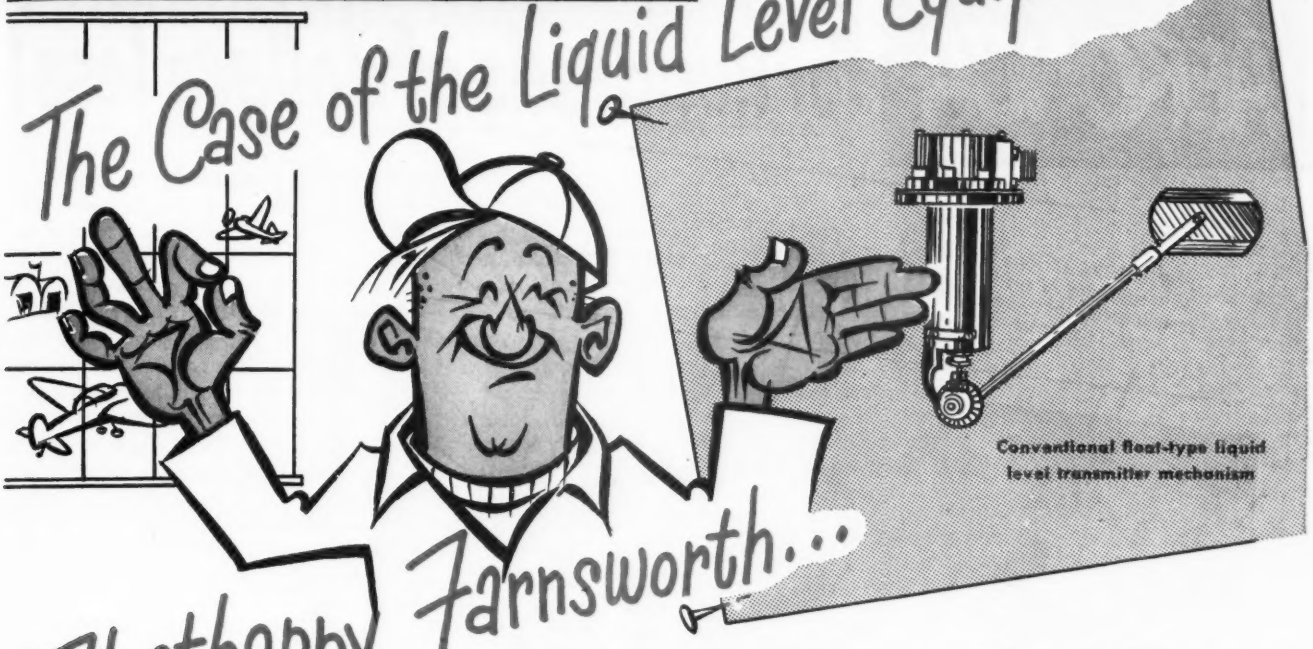
Republic Aviation Corp. has released 200 employes as a result of completion of several Air Force projects, including F-47 spare parts orders; F-84 mobile training units and the XR-12 experimental program. Republic still has 500 F-84s to complete on total USAF order of 1000.

TEMCO (Texas Engineering and Mfg. Co.) has signed $400,000 worth of contracts with foreign governments for aircraft overhauls. Largest TEMCO client is Venezuela with complete overhauls on 19 F-47s; 12 B-25s and conversion of a C-54 into a special executive transport for the president of Venezuela.

Rochester Products division of General Motors is making fuel control units for aircraft jet engines. Rochester division is operating on subcontracts from G-M's Allison division at Indianapolis.

KEEPING AHEAD WITH G-E AIRCRAFT INSTRUMENTS

The Case of the Liquid Level Equipment!

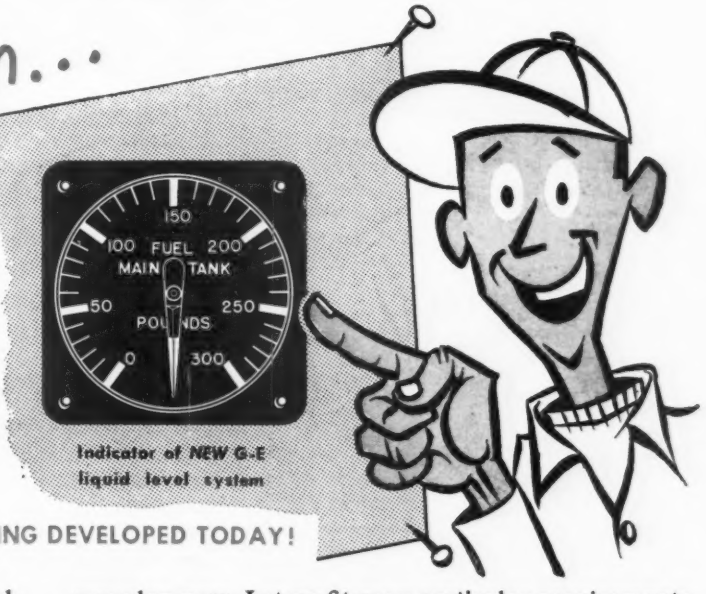


Conventional float-type liquid level transmitter mechanism

Floathappy Farnsworth...

His specs call for ordinary float-type liquid-level equipment. Sure, that system tells exactly how much liquid (by volume) is left in the tanks. This is fine for conventional fuels, or other aircraft liquid quantities. That's all he cares about, so he's perfectly happy.

Progressive Peterson...



Indicator of *NEW* G-E liquid level system

His specs call for the *new* G-E Liquid-level Equipment. The local G-E Sales Engineer has explained how this new system gives a much better indication of the actual fuel-energy left—a must for most newer, and high-speed aircraft. Your G-E representative will be glad to give you the "inside story" on this new system. Just give him a call.

PLAN NOW, TOMORROW'S INSTRUMENTS ARE BEING DEVELOPED TODAY!

Present day instruments are good. But, General Electric is continually striving to make them better. Many new designs which are in the development stage today can be in your aircraft tomorrow. The savings in size, weight, and maintenance costs, and the increased accuracy and reliability can be yours if you plan now. Let us fit your particular requirements into our development of new instruments. See your nearest G-E Representative for information on specific instruments and instrument systems. *Apparatus Department, General Electric Company, Schenectady 5, New York.*

GENERAL ELECTRIC

607-17

proven in '48
improved for '49
the luxuriously new

AERONCA SEDAN for hundreds of dollars less!

new CHROME TRIM—a generous sprinkling of sparkling chrome complimenting the eye, pleasing interior splendor.

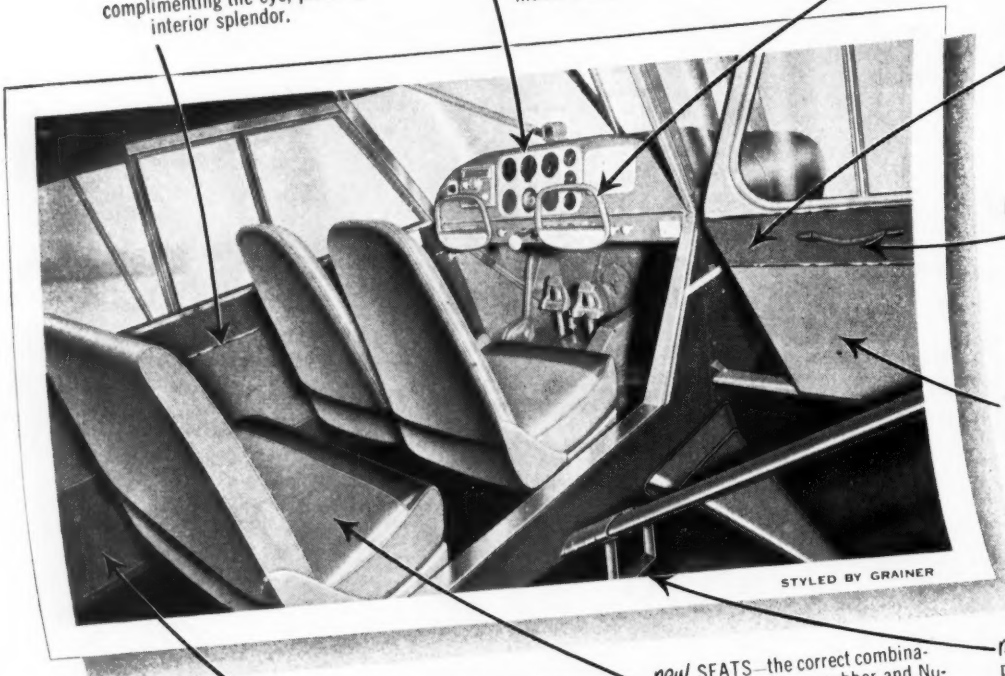
new INSTRUMENT PANEL—beautifully appointed—functionally grouped instrument panel—additional instruments easily installed.

new CONTROL WHEELS—safety engineered—durably finished in harmonizing colors.

new NAUGAHYDE PANELS—providing an eye pleasing yet durable interior treatment.

new DOOR PULL—door latch—New heavy duty door and hinges—flush type door latch—handy door pull.

new SIDE PANELS—top grade woolen fabrics skillfully tailored adding a new note of luxury.



STYLED BY GRAINER

RADIO EQUIPMENT, OPTIONAL

new SCUFF PADS—heavy—long-wearing—easy to clean carpeting extending several inches upward on all side panels.

new SEATS—the correct combination of airfoam rubber and Nu-craft bonded together to provide the utmost in seating comfort.

new STEP—stirrup safety step providing sure-footed cabin entry.

approved

★ AERONCA OFFERS A WIDE CHOICE OF MODELS AND OPTIONAL EQUIPMENT

Chief Seaplane

Chief Skiplane

Champ Seaplane

Champ Skiplane

Champ Sprayer

Champ Farmwagon

Sedan Seaplane

Sedan Skiplane

Sedan Cargo

Crosswind Gear

Sedan Ambulance

compare then buy AERONCA

for further details write to

AERONCA AIRCRAFT CORP.
DEPT. AW, MIDDLETOWN, OHIO

Combustion Studies Offer New Efficiencies

NACA analyses of high-speed flame support isolate numerous approaches to achieve improvements.

Improvement in combustion efficiency ranks with the need for higher heat resistant alloys as the two major problems of the turbojet engine. These two factors, more than any other, delayed the advent of successful jet propulsion for many years and have comprised the major design and research problems in the past decade.

Improvements in combustion efficiency of high-speed flames have been delayed by two prime factors—lack of detailed knowledge of the mechanics, chemistry and thermodynamics of the phenomenon and of research methods and facilities for examining the problem.

That many of the vital factors have been isolated is indicated in the Twelfth Wright Brothers Lecture of the Institute of the Aeronautical Sciences delivered by **Abe Silverstein**, Chief, Wind Tunnel and Flight Research division, Lewis Flight Propulsion Laboratory, NACA, Cleveland.

According to Mr. Silverstein*:

The design of combusion chambers to provide the large rates of heat release required by gas-turbine engines operating with high cycle temperatures and pressures introduces fundamental problems for the solution of which there exists no really adequate theoretical or experimental background.

The magnitude of the combustion problem can be appreciated from the estimated heat-release requirements for flight at high speeds, for the turbojet and ramjet.

At 500 mph. at 30,000 ft., the turbojet heat-release rate (Btu./cu. ft./hr.) is 6×10^6. At 1500 mph. at 30,000 ft., the heat-release rate is 50×10^6. For the ramjet at 1500 mph. and 30,000 ft., the rate is 30×10^6.

► **Characteristics Desired**—The applied goals of combustion research are to provide a combustion chamber having the following characteristics: A high rate of heat release per unit volume; a large air mass flow per unit area of chamber cross section; stable combustion with good combustion efficiency over a wide range of conditions of combustion-chamber air temperature, pressure, flow velocity, and fuel-air ratio; light weight and small size; long life at extremely high temperature, which implies both a resistance to deterioration of the materials in strength or form and the accumulation of undesirable solids; and reasonable simplicity in construction and maintenance.

Because the energy available from the addition of heat is obtained by the subsequent expansion of the combustion gases, all the combustion-chamber qualities specified must be provided with a minimum loss in total pressure of the gases passing through the combustion chamber.

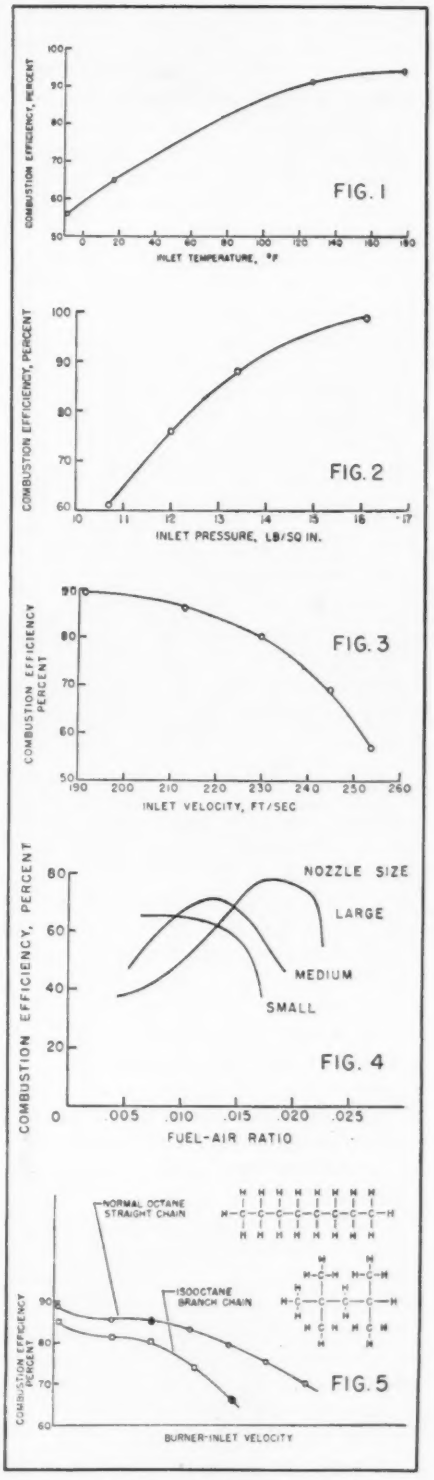
► **Combustion Efficiency**—One of the most fruitful techniques for studying the effects of the various parameters that influence the combustion process is to establish the operation of the combustion chamber under controlled conditions near one of the limits of stable combustion. In this way the primary factors controlling the combustion process under the established conditions are readily discerned and their effects evaluated.

By this and other devices, which required a parallel development in the art of temperature, pressure, and airflow measurement, the effect of combustion-chamber inlet-air temperature, pressure, and velocity on the combustion efficiency have been established for combustion chambers of current design.

The combustion efficiency is taken as the ratio of the increase in total temperature actually obtained across the combustion chamber to that which which could be realized if all the fuel were completely burned. Fig. 1 shows the characteristic improvement in combustion efficiency obtained by raising the inlet-air temperature.

Rate of increase of combustion efficiency with inlet-air temperature is marked at the low inlet-air temperatures. The temperature beyond which further temperature increase will not change the combustion efficiency materially will vary according to the conditions of operation and the combustion-chamber configuration.

Increase in the rate of fuel vaporization, the reduction in the temperature rise required to bring the fuel-air mixture to the ignition temperature, and



How combustion efficiency is affected by:
1. **Inlet-air temp.; fuel-air ratio, .016.**
2. **Inlet-air pressure; fuel-air ratio, .010.**
3. **Inlet-air velocity; fuel-air ratio, .016.**
4. **Size of the fuel nozzle.**
5. **Composition of the fuel.**

* Excerpts from his extensive lecture delivered in Washington, D. C.

the acceleration of preflame oxidation reactions that reduce the ignition time lag when the ignition temperature is reached are probably the principal effects that provide the benefits to be obtained from high inlet-air temperatures.

► **Pressure, Velocity Factors**—The increase in combustion efficiency with increasing inlet-air pressure shown in Fig. 2 is typical of the results obtained with all types of combustion chambers. Because the rate of chemical reactions increases with the concentration of the reactants, the improvement in the combustion process with increasing inlet-air pressure is consistent with the classical ideas on reaction rates.

If a combustion chamber is operating on the sloping portion of either or both the combustion efficiency-temperature and combustion efficiency-pressure curves, the reduced air temperatures and pressures encountered in altitude flight can be expected to give lowered combustion efficiency.

An altitude flight ceiling is reached above which the combustion chamber fails to provide combustion gas at the turbine-inlet temperature required to operate the engine.

The reduction in combustion efficiency with increasing combustion-chamber inlet-air velocity shown in Fig. 3 is largely due to the decreased time a given mass of combustible mixture remains in the combustion zone to complete its burning.

At low inlet-air velocities there is sufficient time for the combustion to be completed before the addition of secondary air in the turbojet combustion chamber stops further reaction or the exit of the ram jet is reached. A nominal increase in velocity at low inlet-air velocities will not adversely affect the combustion efficiency, as shown by the flat portion of the curve.

► **High Turbulence**—Whereas the rate of propagation of flames normal to the flame front in quiescent stoichiometric fuel vapor-air mixtures is of the order of several feet per second, average gas velocities of the order of 250 fps. through the combustion chamber are common practice in turbo and ramjets.

The high-velocity combustion is achieved in the turbojet by providing a combustion zone at the upstream end of the combustion-chamber liner in which the air velocity is low when the average air velocity through the combustion chamber is about 250 fps.

A high degree of turbulence is induced in the combustion air to increase the interface between zones rich in fuel and zones rich in oxygen. A rapid mixing by diffusion of the fuel and oxygen molecules occurs, and an effective flame front many times the area of cross section of the combustion zone is produced. With a high ratio of flame-front area to combustion volume, an extremely short displacement of the flame front normal to itself is required to consume the fuel.

► **Fuel Spray**—The evaluation of effect of fuel-air ratio on the performance of the combustion chamber is often obscured by the change in the characteristics of the fuel spray with the changing fuel-flow rate necessary to vary the fuel-air ratio.

The accumulated experimental evidence, however, supports the following theory: Combustion proceeds most rapidly in stoichiometric mixtures of vaporized fuel and air. If instantaneous vaporization of fuel and intimate mixing with air can be achieved, then improvement in combustion efficiency should be obtained as the fuel-air ratio is moved toward the stoichiometric value.

However, stratification of the fuel and the air is unavoidable and is often the principal factor controlling the combustion process. At low fuel-air ratios, a rapid fuel vaporization in a limited portion of the air flow is desirable to provide a local zone where near-stoichiometric mixtures can be established. A nozzle that provides a fine fuel spray with a small degree of penetration should therefore serve best at low fuel-air ratios.

As the fuel flow is increased with constant air mass flow, overenrichment of these local zones would result with the same fuel nozzle. Better results are obtained with a fuel nozzle that provides a coarser fuel spray with greater penetration range in order to involve a larger portion of the air with the fuel and to maintain the local optimum fuel-air ratio.

Experimental verification of this reasoning is shown in Fig. 4. As the fuel-air ratio is progressively increased, the combustion is served best by coarser and coarser fuel sprays.

In the ramjet, peak combustion efficiencies generally occur at fuel-air ratios less then stoichiometric. This shift in peak combustion efficiency to fuel-air ratios leaner than stoichiometric is attributed to fuel stratification.

With overall fuel-air ratios close to stoichiometric, fuel stratification will give overrich zones in which the excess fuel cannot burn regardless of how favorable the conditions for combustion may otherwise be.

Research leading to the development of methods for reducing the degree of fuel stratification may provide an increase from 10 to 20 percent in the temperature rise across the ramjet combustion chamber.

► **Full Properties**—Early combustion-chamber studies conducted under sea-level conditions indicated that, except for carbon deposition, there is little difference in the performance to be obtained from common hydrocarbons covering a reasonably wide range of chemical composition and distillation characteristics.

However, when the combustion process was studied under simulated high-altitude flight conditions, where operation of the combustion chamber becomes marginal, the need for a stricter specification of the chemical properties of the fuel became evident. For example, straight-chain paraffin hydrocarbons give better combustion efficiencies than their corresponding branch-chain isomers.

The order of the difference the fuel composition can make in combustion efficiency is shown in Fig. 5 for the straight-chain normal octane and its branch isomer, iso-octane, both of which have about the same boiling point. An advantage of almost 20 per cent in the combustion efficiency is shown for the normal octane over iso-octane at the higher air mass flows. Also, the straight-chain hydrocarbons are to be preferred for their tendency toward low carbon deposition.

Differences in performance of the fuels based on their distillation characteristics and other physical properties can be eliminated to a considerable extent by the proper matching of the fuel-injection system to the fuel.

Fuels for use in current high-speed aircraft in which the storage volume is limited require the further specification that the fuel shall have a high heat of combustion per unit volume. Where weight and not volume is the critical factor, the heat of combustion per unit mass of fuel must be large.

The search for fuels that meet these requirements has led to the consideration of unconventional fuels and the problems of manufacture, availability.

► **Study of Components**—Parallel with the direct experimental approach to the problem of improving jet-engine combustion by studying the combustion in actual chambers has been the detailed basic study of the separate mechanisms involved in the complete process.

These studies include the theoretical and experimental investigations of the mechanism and the kinetics of fuel oxidation, ignition of explosive mixtures, mixing of dissimilar gas streams, fuel-spray droplet-size determination, fuel-vaporization rate process, and flame-propagation rates in quiescent and flowing combustible mixtures.

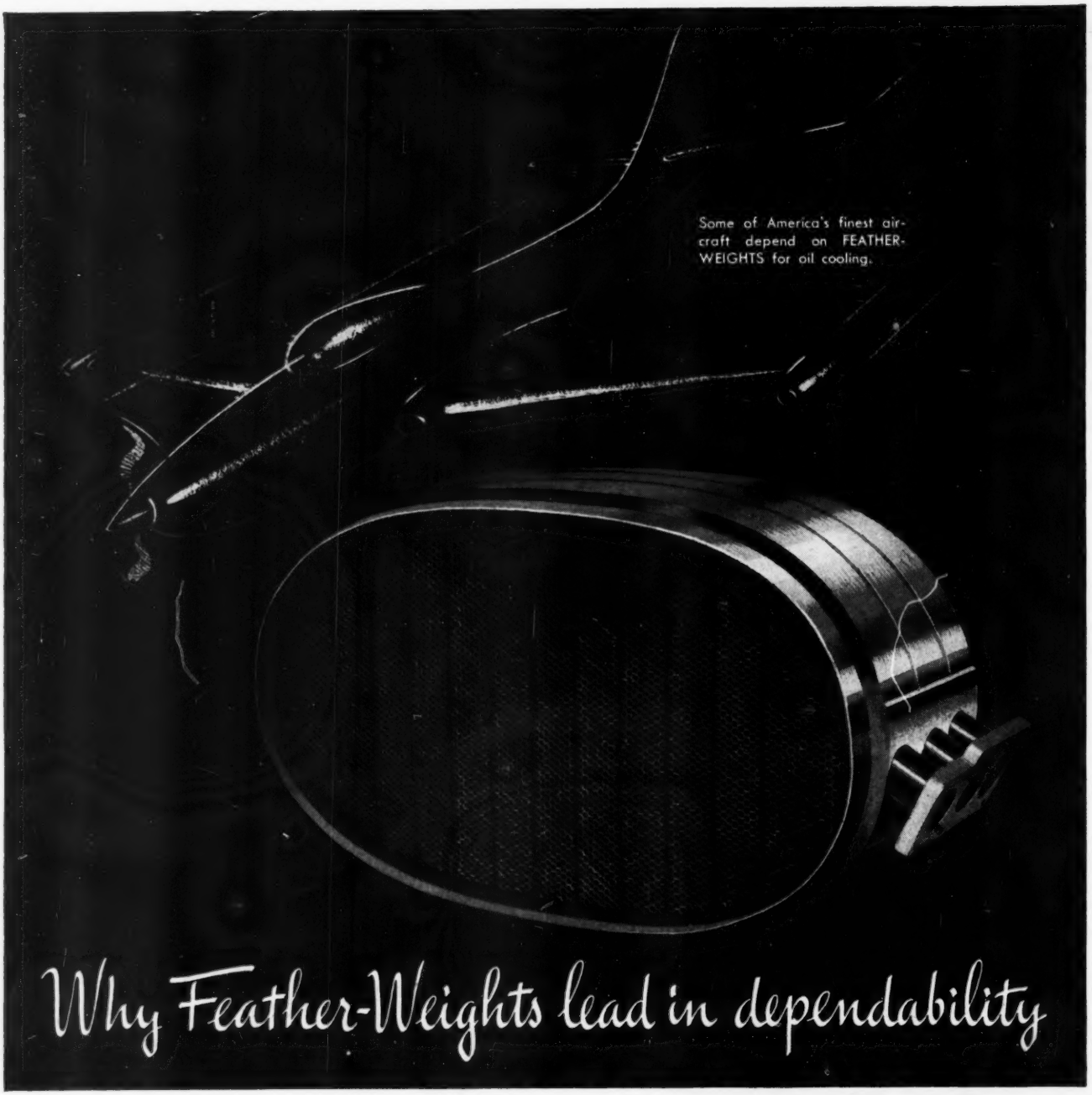
The successful completion of these studies will provide theoretical and engineering bases for further improvement in the jet-engine combustion chambers which can be gained only with great effort by our present empirical experimental methods.

"**VELOCITY OF FLAME** propagation of jet fuel components is measured to thousandths-of-a-second accuracy in this 14 foot test tube... an important test technique developed by Esso Laboratories in its search for better fuels for the world's fastest planes."

W. R. F. Guyer
Esso Laboratories
Linden, N. J.

"**AFTER USING** Esso Aviation Fuels and Lubricants for thousands of hours in our agricultural planes, where good, reliable performance is really essential, and knowing about the thorough research behind every Esso Aviation Product—we make it a point to recommend Esso Aviation Fuels and Lubricants to our customers."

J. E. Hooper, Jr.
Vice President & General Manager
Zigler Flying Service, Inc.
Jennings, La.



Why Feather-Weights lead in dependability

Unique construction and superior testing make FEATHER-WEIGHT Oil Coolers first choice for more and more modern aircraft.

Light, strong and compact because of patented aluminum alloy brazing of their thin all-aluminum sections, FEATHER-WEIGHTS offer the maximum weight-strength combination.

Thoroughly tested in our wind tunnel laboratory, the largest, most modern in the aeronautical heat exchanger industry, FEATHER-WEIGHT performance is accurately predicted under actual flying conditions.

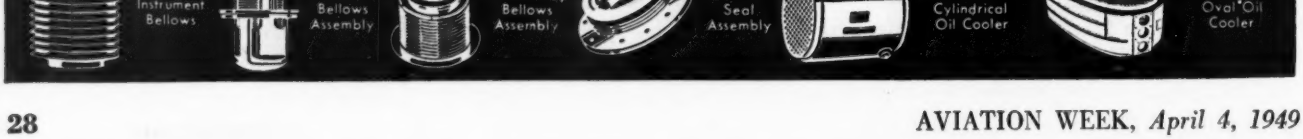
Inquiries concerning FEATHER-WEIGHT all-aluminum oil coolers are invited. CLIFFORD MANUFACTURING COMPANY, 136 GROVE STREET, WALTHAM 54, MASS. *Division of Standard-Thomson Corporation.* Offices in New York, Chicago, Detroit, and Los Angeles.

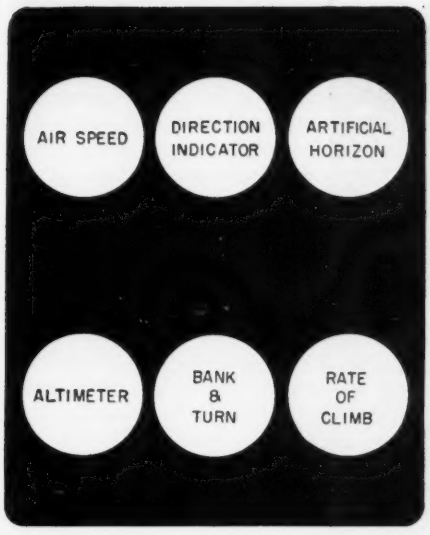
CLIFFORD

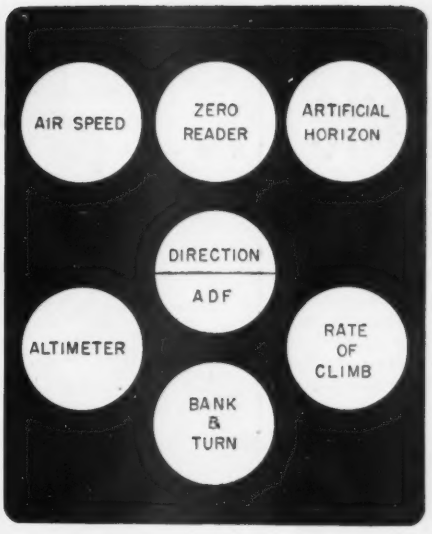
HYDRON Metal Bellows

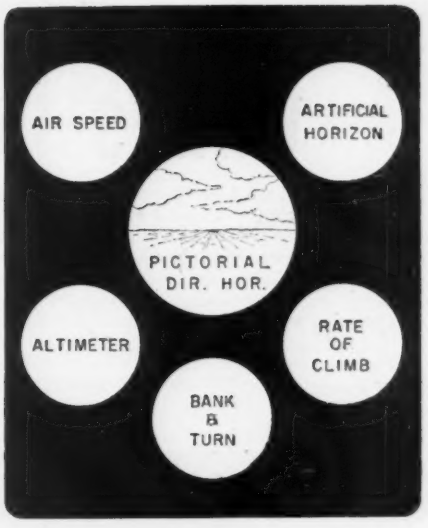
ALL-ALUMINUM OIL COOLERS
FOR AIRCRAFT ENGINES

HYDRAULICALLY-FORMED BELLOWS
AND BELLOWS ASSEMBLIES









Consideration of instruments is important phase of cockpit standardization. These formulations for basic flight instruments show an immediate proposal (left), scheme for later use (center), and plan for future application (right) under study at Navy Special Devices Center. Feature installation of the last-mentioned arrangement is the pictorial instrument in middle.

Cockpit Standardization Assessed

Group representing various segments of aviation field offer opinions on what is needed to promote safety and economy.

By Irving Stone

Engineers are finding that the growing complexity of aircraft has placed a heavy hand on efforts to achieve a reasonable degree of cockpit standardization.

Attainment of this uniformity in cockpit equipment and layout is generally conceded to be amply justified by two factors which vitally affect the aeronautical picture—safety and economy.

Cockpit dissimilarity has created operational hazards which have exacted a significant toll in lives and injuries. And widely differing cockpit planning by various purchasers—even in the same models of aircraft—has slowed production and introduced additional heavy expense.

Stimulating views on cockpit standardization were aired recently at a joint meeting of the Institute of the Aeronautical Sciences and the Society of Automotive Engineers in New York.

A talk by Cmdr. Howard M. Avery, Navy representative on the Cockpit Layout Panel of the Aircraft Committee, Munitions Board, brought pointed discussion from a panel of experts composed of representatives of an aircraft manufacturer, the Civil Aeronautics Board, Navy research and airlines.

▶ **Basic Problems**—Cmdr. Avery's premise was that the pilot cannot possibly assimilate all the complexities of information and operation associated with instruments, controls, communications, navigation, power, radar and traffic. The list of pressing cockpit considerations now includes over 100 items. Obviously, the basic solution would be to throw away all "unnecessary" equipment.

After this, the first consideration in the overall approach to eliminate complexity is to simplify the location and movement of controls.

A second factor is the selection of characteristic knob shapes for controls to avoid confusion. These have been whittled down to 11 basic configurations.

A third consideration concerns seating of the pilot and his range of movement—important details in eliminating fatigue. Studies by the Air Materiel Command have resulted in a plan for a seat arrangement providing for an adjustment of 3 in. forward and 7 in. up as a compromise for pilots of various sizes.

Another important detail is eye location for optimum forward sight to carrier deck or runway and for easy observance of instruments.

As a basic approach to the problem of cockpit standardization, a guide is being sent out by the Navy and the Air Force to its contractors, but the formulations are not mandatory.

▶ **Proposals for Instruments**—The Committee has not yet agreed on a standardized instrument panel, but this is the next step on the program.

Proposals for the Services have been formulated for inclusion of basic flight instruments in a single-seat craft or in a two-pilot plane, with similar instrument before each pilot.

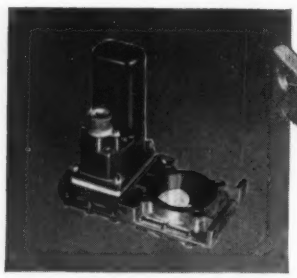
- An immediate proposal consists of two horizontal banks of three instruments each. In the top row are an airspeed indicator, director finder, and standard artificial horizon; in bottom row are altimeter, turn and bank, and rate of climb. Alternate installation includes an automatic direction finder above the turn and bank.
- A more advanced plan provides, in the top row, an airspeed indicator, Zero Reader, and standard artificial horizon; bottom row, an altimeter, combination dial for direction indicator and ADF, and rate of climb. Below the combination dial is a turn and bank.

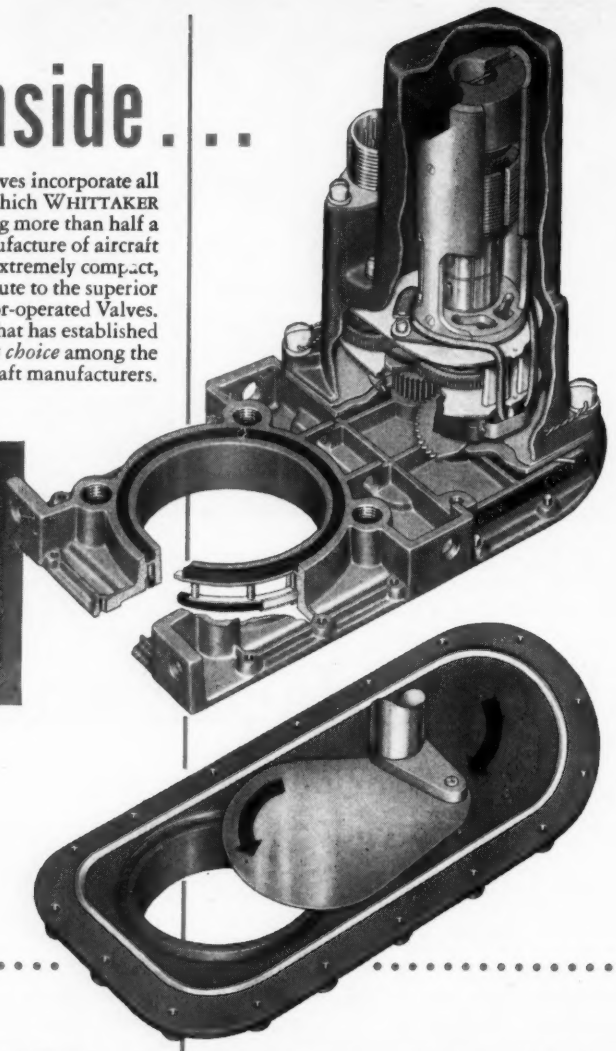
Cmdr. Avery holds that the pilot would spent 60 percent of his time on the Zero Reader and use the other instruments as references, the Reader doing for him what his brain could not accomplish conveniently because he could not think fast enough.

- Still another arrangement for basic flight instruments contemplated for future use is already under study at the Navy's Special Devices Center. In the top row are an airspeed indicator and standard artificial horizon with a blank space between. In a similar arrangement, the bottom row has the altimeter and rate of climb indicator. In the middle of this layout is an instrument referred to as a pictorial directional

what's inside...

WHITTAKER Motor-operated Slide Valves incorporate all of the flight-proven, time-tested features which WHITTAKER has pioneered and perfected during more than half a decade of specialized experience in the manufacture of aircraft valves. These features, combined with extremely compact, lightweight construction, contribute to the superior operating performance of WHITTAKER Motor-operated Valves. And it is this outstanding performance that has established WHITTAKER Valves as *first choice* among the world's leading aircraft manufacturers.





INDIVIDUALLY ENGINEERED DESIGNS. WHITTAKER Valves are designed, engineered, and constructed to meet *your* specific requirements. Years of painstaking research and testing have developed certain basic valve patterns. WHITTAKER'S staff of design and research engineers apply your valve requirements to these proven basic designs.

and what goes into...

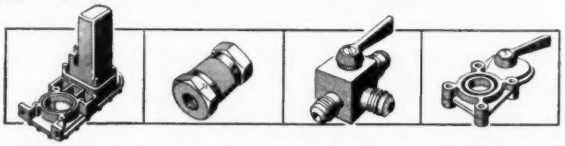
RIGID SHOP INSPECTION AND TESTING. WHITTAKER Valves are carefully checked and inspected at every stage of manufacture. Before leaving the factory, valves are tested under actual operating conditions for strength, leakproof closures, smoothness of operation, etc. —your assurance that they will do the job for which they are designed and constructed.

MODERN, FULLY INTEGRATED MANUFACTURING FACILITIES. Only the highest quality materials and precision workmanship are used in the manufacture of WHITTAKER Valves. Special machines and production techniques further promote the quality of the finished product. Both valve bodies and actuator assemblies are manufactured in WHITTAKER'S modern, completely integrated plant.

FIELD SERVICE. WHITTAKER maintains a staff of technically trained, field service engineers. These men are thoroughly experienced in aircraft valve design and application, and stand ready to assist you on any valve design, installation, servicing, or replacement problems.

Individually engineered designs... easier installation ... better performance... lower maintenance... longer life! These are the benefits you get with WHITTAKER specialized aircraft valves. WHITTAKER'S versatile engineering staff stands ready to link the economies of proven design to your specific requirements. WM. R. WHITTAKER CO., LTD., 915 N. CITRUS AVE., LOS ANGELES 38, CALIF.

valves by *Whittaker*



Motor-operated slide valves | Check valves | Plug valves | Lever operated slide valves

First IN DESIGN

First IN PERFORMANCE

First WITH VALVES THAT ARE FIRST CHOICE IN INDUSTRY

horizon, for easy determination of attitude from the cockpit. (It was intimated that this pictorial device may be in use soon.) In a vertical line with this instrument, and below the bottom row is the bank and turn.

In this arrangement, the stick would be to the right side of the panel, lever for power settings to the left.

A clock is included in all three schemes, located to the right and below the main arrangement.

▶ **Other Instrument Factors**—Ease of instrument dial reading is considered an important detail. Space as small as ⅛ in. between divisions is deemed to be of doubtful value. Desirable spacing would be ¼ in.

The British plan for easy dial reading is considered to have appreciable merit—an oblong main division marking to match a squared-off pointer so that exact line-up or offset between the two are readily seen.

Lighting of the instrument panel has to be licked before a final layout can be approved. The solution advanced contemplates, first, the choice of lighting, then building the dial to suit the lighting, and finally deciding the location of instrument.

▶ **Correlation Desirable**—A noteworthy example of cockpit confusion was stated to exist in the correlation of instruments and controls.

Case cited to illustrate this condition was that of the pilot who was instructed to climb from 9400 to 9600 ft. He pulled back on the stick to climb, but noted that the altimeter pointer dropped in going to the higher dial marking. This momentarily confused him, because he was thinking that the pointer should have gone up in a climb.

The obvious answer would be to have pointer travel coincide with craft behaviour.

▶ **Cockpit Location** – Another problem attendant with the cockpit, in addition to that of general layout, is where it should be located for greatest safety.

Cmdr. Avery disclosed one solution offered by a Czech engineer now working in England. Unconventional as it may seem, he suggests that the cockpit be located in the vertical tail of the aircraft, because the tail is the one part of the plane not generally damaged in a crash, whereas the nose section is most dangerous.

Cmdr. Avery's terse conclusion was that if money and time are to be saved in training of pilots and if loss of lives and aircraft are to be minimized, cockpit standardization must be achieved.

• **William Stieglitz,** Republic Aviation Corp. engineer frankly stressed the need for greater consideration of safety in aircraft design.

Commenting on the usual determination of "pilot error" as the cause of accidents, he said that in many cases "the mistake was built into the plane, just sitting there waiting for the pilot to make it."

As an example of how lack of standardization can bring continual changes to boost the cost and slow production of aircraft, he related how during the mockup stage of a transport, 31 alterations were made on the cockpit console for one of two airlines involved. And as would be expected, consoles ultimately selected by each airline were different.

• **Robert V. Garrett,** of CAB's bureau of safety investigation, revealed that cockpit standardization in Air Force C-54s and Navy R5Ds had contributed greatly to the safety achieved in Berlin airlift operations.

• **Robert Ayers,** American Airlines' assistant director of flight engineering interjected a note of caution for the general theme of cockpit standardization. He said that if we standardize too much, we will stunt development.

• **Lt. Cmdr. George Hoover,** whose assignment at the Navy's Special Devices Center, Sands Point, Long Island, N. Y., is to "dream up" future cockpit devices, stressed the thought that extreme simplification would be required ultimately—in effect no more complication than the pilot gets in his elementary training.

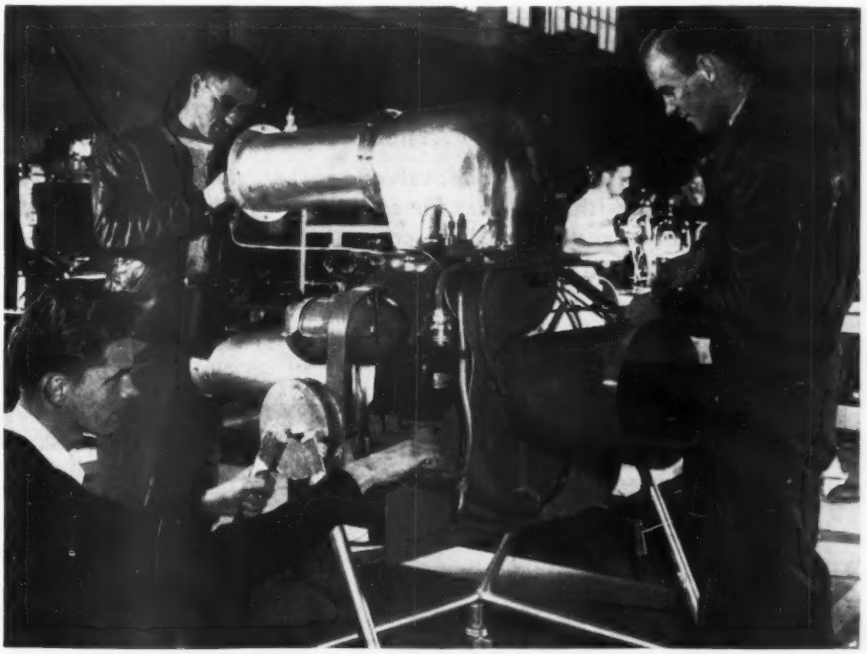
He says the windshield probably will not be part of the future plane, because at extreme altitude there's nothing for the pilot to see. And oncoming enemy planes will probably approach so fast that the pilot would be taking responsive action "in the past." What he probably should have is a large pictorial display, showing in ample time for effective response, exactly what is happening outside.

▶ **Flight Engineer**—Status of this crew member was also considered. Cmdr. Avery held that the flight engineer's station was necessary. He said the pilot "can't fly the engines," because he has too many other considerations to burden him.

He explained that on one B-47, pilot had two throttles before him—one each for control of three engines on each wing. Behind him, the copilot-engineer had six throttles—for individual adjustment of each engine.

Mr. Ayers commented that when the pilot was given a copilot, after he got to know him he gave him certain responsibilities—but not emergency responsibilities.

Now he has another member included in the crew—the flight engineer. Ayers stated that he has been told by many of his pilot acquaintances that they do not delegate responsibilities to the flight engineer.



FOR COOLER TURBINE BLADES

Novel reverse flow combustor is L-shaped structure on top of this baby turbojet engine developed from supercharger base by students of Northrop Aeronautical Institute, Hawthorne, Calif. Design is intended to add to turbulence of air forced into combustor box and cool inner combustion chamber to reduce gas temperature at turbine wheel. Latter objective parallels that of engine developed by Hawkins & Associates, Van Nuys, Calif., which shows no heat glow from blades, even at top speeds. Northrop engine weighs 180 lb., is expected to deliver 200 lb. thrust.

HANSEN COUPLINGS GIVE YOU 2 Big Advantages

1 QUICK CONNECTION AND DISCONNECTION

2 INSTANT AUTOMATIC FLOW OR SHUT-OFF

THESE FEATURES engineered into HANSEN couplings save users both time and money.

Any fluid system carrying gases, liquids, or grease can be improved by the installation of these quick-connective, automatic shut-off couplings. Slight movement of the sleeve releases the plug, and flow instantly stops. Insertion of the plug opens the line to flow... immediately... automatically.

Three types of couplings offer valve in socket, valves in socket and plug, or without valves for straight-through flow. Engineered for specific types of service, including air, oxygen, grease, acetylene, oil, hydraulic fluid, gases, or solvents.

Ask for the new catalog of our industrial line, with engineering data, or for specific information regarding the adaptation of HANSEN couplings to your product.

HANSEN REPRESENTATIVES

New England States: Pearse-Pearson Co., West Hartford, Connecticut, Boston, Massachusetts
Atlantic, Gulf States: B-R Engineering Co., Baltimore, Md.
Northern Ohio: F. & W. Ursem Company, Cleveland, Ohio
Southern Ohio, W. Va., Northeastern Ky.: Steinhagen Airline Products, Dayton, O.
Tennessee, Arkansas, Kentucky: Ralph A. Hiller Co., Nashville, Tennessee
Michigan: William H. Nash Company, Detroit, Michigan
Indiana, Wisconsin: Neff Engineering Company, Ft. Wayne, Indiana, Milwaukee, Wisconsin
Northern Illinois, Eastern Iowa: Walter Norris Engineering Company, Chicago, Illinois
Central Midwestern States: Sturgis Equipment Co., St. Louis, Missouri
North Midwestern States: Hanscome-Rogness Company, Minneapolis, Minn.
Texas, Oklahoma: C. C. Brownfield, Dallas, Texas
Colorado, New Mexico, Utah, Wyoming: E. C. Wild Co., Denver, Colorado
Northern Calif., Nevada: R. J. Gentles, San Francisco, California
Arizona, S. California: Chester Paul Co., Glendale, California
Idaho, Oregon, Washington: Jack J. Kolberg Company, Seattle, Washington

IN CANADA
Province of Ontario: John Best Associates, Toronto, Ontario
Quebec & Maritime Provinces: Cowper Company Ltd., Montreal, Quebec

THE HANSEN MANUFACTURING COMPANY
4031 WEST 150th STREET • CLEVELAND 11, OHIO

Aviation Draws Deeply From U. S. Industry

That aircraft manufacturing efforts involve wide segments of the U. S. industrial field is evident in that during 1948 United Aircraft Corp. used goods and services of more than 5,000 subcontractors and suppliers in 36 states.

Thus, it is apparent that the "aircraft industry" actually comprises a substantial portion of all U. S. industry, with particular emphasis on small business establishments.

Largest United Aircraft user of subcontractors and suppliers is Pratt & Whitney Aircraft division, which required parts, raw materials, supplies and services from more than 4000 firms in 36 states and the District of Columbia. Manufacture of the Turbo-Wasp JT-6B alone required parts and materials from 145 subcontractors in 16 states.

Hamilton Standard Propeller division utilized 1494 suppliers in 28 states and the District of Columbia.

Chance Vought Aircraft division used products of 131 machine and tool shops and general subcontractors in 8 states.

Sikorsky Aircraft division called on 173 subcontractors in 14 states for production of helicopters.

Instrument Warns Of Oxygen Lack

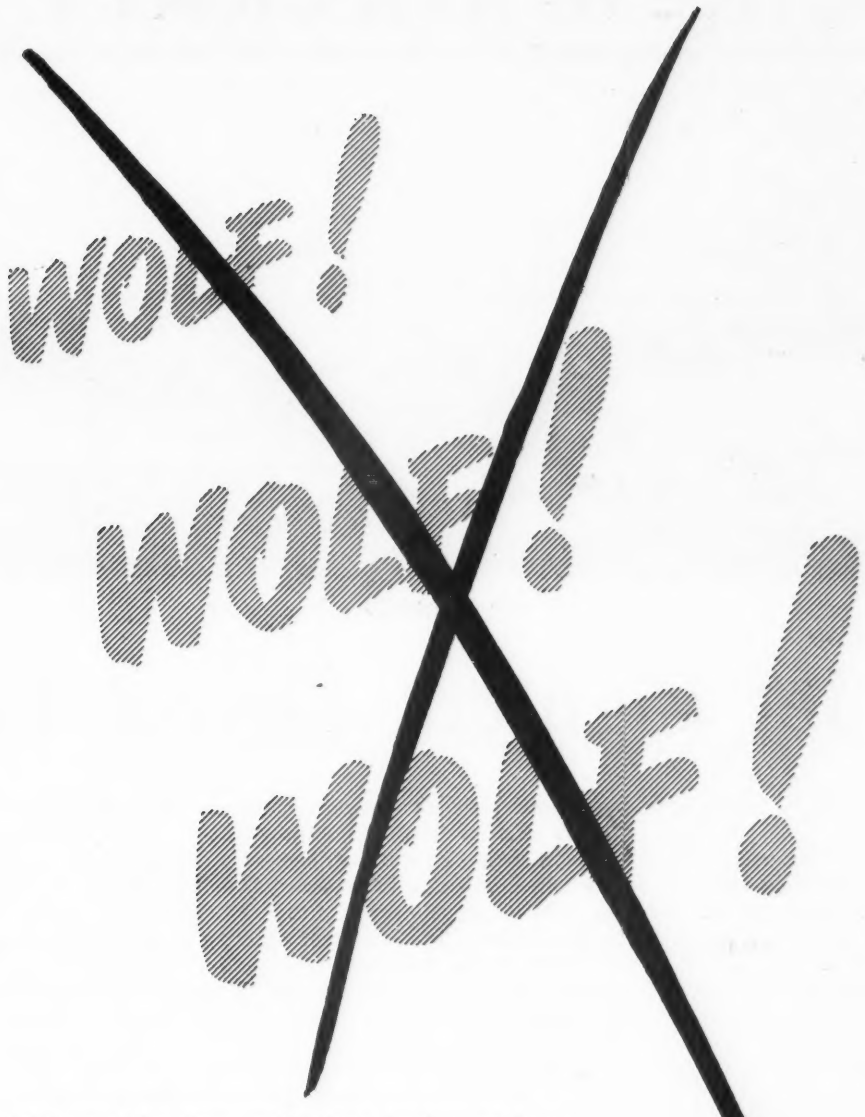
A new device which warns pilots when lack of oxygen becomes dangerous has been developed by the Air Force School of Medicine at Randolph Field, Tex.

It is a small scale "brainwave" measuring device, an electroencephalograph (EEG), which fits on the head and signals the pilot when brainwave changes indicate that he is affected by hypoxia—oxygen-lack.

At 25,000-ft., the time between the onset of hypoxia and the passout moment is 270-sec.; miniature EEG equipment will warn the pilot within 100-sec., giving him almost 3 min. to use or adjust his oxygen supply.

Experiments with the oxygen warning device have been successful on 105 out of 107 men tested. Allowing for a slightly greater margin where the device could be ineffective because of individual variations, neurologists believe the safety factor still will be great enough to justify use of the equipment.

Head-electrodes of the unit will be incorporated into helmets currently in use. Cables leading from the electrodes will plug into a warning box in an arrangement similar to that customarily used for earphones.



Unfrightened by dire predictions, leaders of American business always have planned with confidence in the future . . . and, in the long run, their faith has paid off. Such courageous leadership helps to *create* good business.

Good business means jobs for those who want to work. It's the best defense against the termites who are working to undermine the individual liberties Americans enjoy. 6593

SKF INDUSTRIES, INC. PHILADELPHIA
BALL and ROLLER BEARINGS

NEW AIRCRAFT

SO-6020

Two Jet Fighters Reveal French Desig

(McGraw-Hill World News)

PARIS—Two new French turbojet fighters have just completed initial test flights successfully. They are the SO-6020 (photos, this page) and the Dassault company's Ouragen, or "Hurricane" (photos, next page). Both are powered by British-designed, 5000-lb.-thrust Nenes. SO-6020 incorporates a French-made Hispano version; Dassault MD 450 a Rolls Royce unit.

Heavy armament characterizes the swept-wing SO-6020. It mounts four 30mm. cannon or six 15mm. machine guns in the forward fuselage section, and carries sufficient ammunition for 18-25 sec. of continuous firing—720 cannon shells or 1900 cartridges.

▶ **Photo-Recon Possibility**—Normal fuel capacity is 600 gal., reported to give the craft air time of 1½ hr. without refueling. Provisions have been made to permit quick conversion of the plane for photo reconnaissance work, allowing additional space for 200 gal. of fuel.

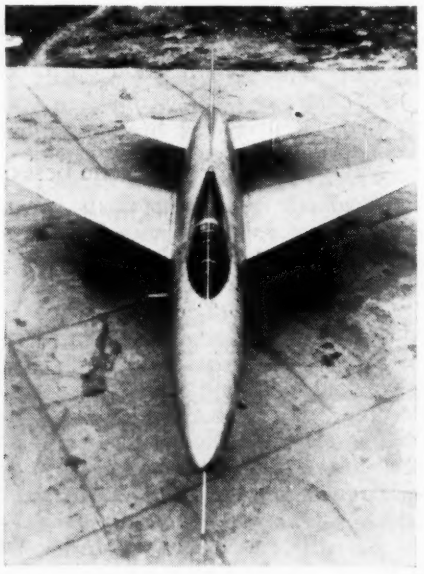
Cockpit is pressurized and pilot's seat is ejectable through a cartridge-release mechanism.

No decision has been reported as to when the craft will go into production or how many will be built.

▶ **What's Expected**—Estimated performance, at total weight of 17,500 lb., is a top speed of 645 mph. at sea level, 600 mph. at 32,000 ft.; ceiling, 40,000 ft.; takeoff speed, 135 mph.; takeoff run, 2800 ft.; landing speed 118 mph.; rate of climb at sea level, 5910 fpm., and at 32,000 ft. 1572 fpm. Estimated time of climb to 33,000 ft. is 10 min.

Craft's span is 34.9 ft.; length 49.2 ft.; wing area, 270 sq. ft.

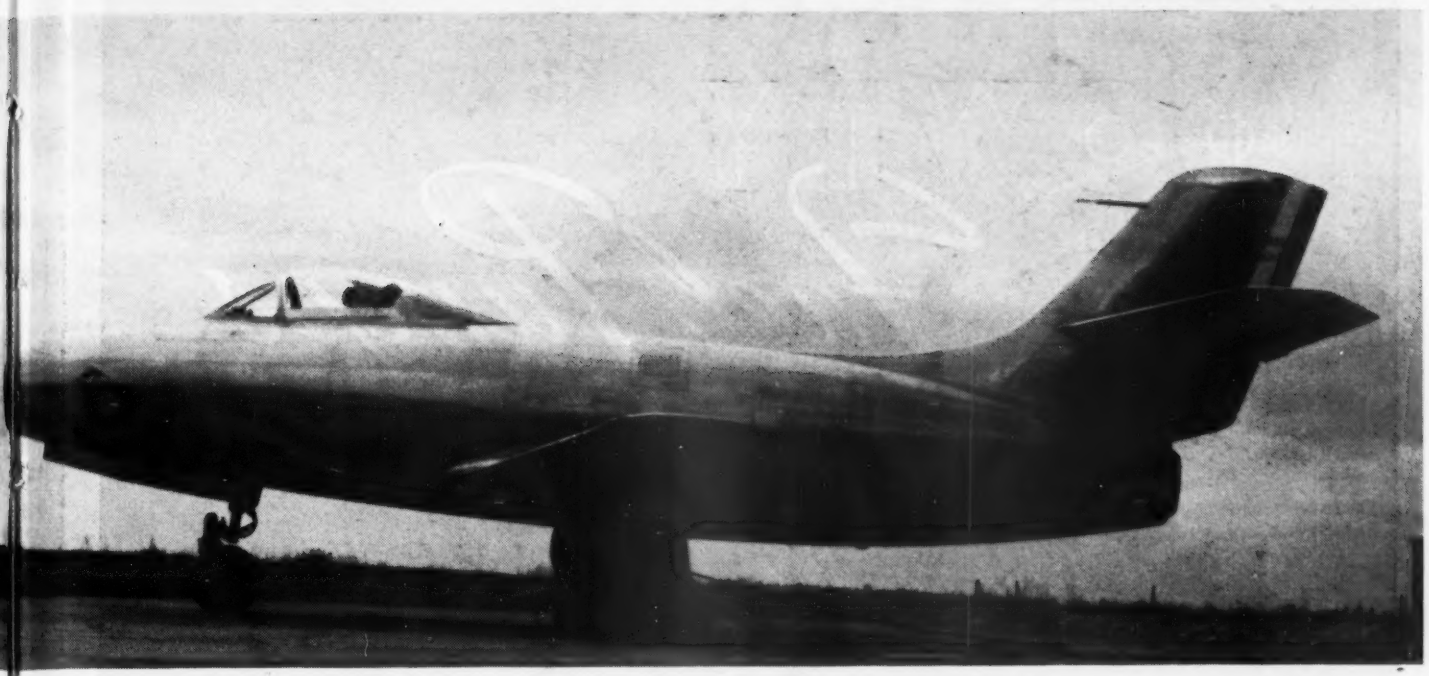
▶ **Poor Intake Location**—A serious operational defect has been disclosed, stemming from location of the air intake in the fuselage belly, directly aft of the nose gear. This allows mud and dust



Weigh empty..
Fuel ad.....
Armam t .....

Engine .....

Static hrust, at
12,3 rpm...
Span .....
Length .....
Wing ea .....
Top sp d, sl...
Rate of limb, sl.



Dassault Ouragen MD-450

esign Progress

Efforts to catch up after the war finally are bringing results, but production plans vague.

kicked up by the wheel to be taken into the air opening. To remedy this condition, it is planned to alter the fuselage to locate the air intake on top of the structure.

▶**MD 450 Promising**—The lighter MD 450 is considered by many top French airmen to be the most promising jet fighter yet to be developed in France. French Air Force is reported seriously considering a substantial order.

It is an unswept low-wing configuration, with axial air intake in the nose. Four 15mm. machine guns comprise the armament, and 100 rounds of ammunition afford 15 sec. continuous firing. The plane may also be fitted with rockets, and it is armored fore and aft. Cockpit is pressurized.

▶**Performance Data**—Estimated performance, at weight of 11,200 lb., is top speed of 600 mph. at sea level, 535 mph. at 30,000 ft.; takeoff run, flaps up, 2780 ft.; flaps down, 2130 ft.; takeoff run over 50-ft. obstacle, flaps up, 2900 ft., flaps down, 2260 ft.; landing run over 50-ft. obstacle, 2500 ft.; rate of climb at sea level, 7800 fpm. at 30,000 ft., 1920 fpm.

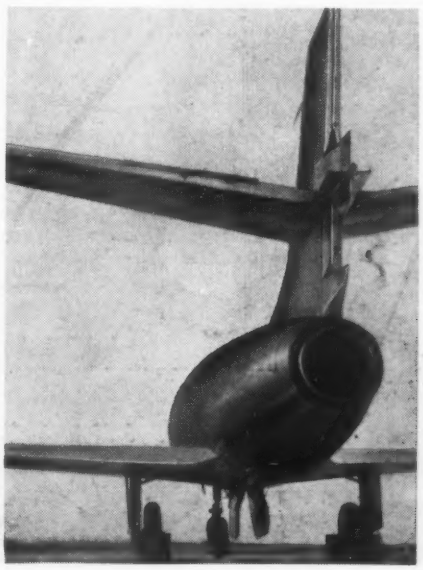
Span is 41.6 ft., length 35.1 ft., height 13.1 ft., and wing area 256.9 sq. ft.

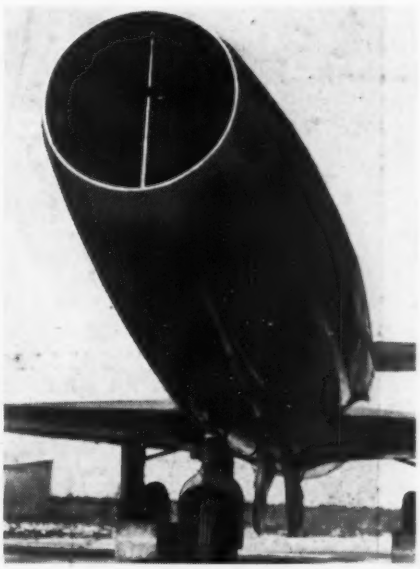
Radius of action is reported to be 5 min. of climb and 10 min. of combat at maximum thrust plus 30 min. cruising and descent. With supplementary fuel tanks, range is roughly 750 mi. at 10,000 ft.

These two designs are among the more than 15 jet prototypes built in France since the end of the war. France had a lot of catching up to do and tried to do it too fast (AVIATION WEEK, Feb. 28). Result was confusion, and a decision to cut back the aircraft building. Until planes such as these reach production, France will import some jet fighters.

Specifications

	SO-6020	MD 450
empty..	11,300 lb.	7250 lb.
d.....	3300 lb.	2510 lb.
nt	3570 lb. (cannon) 2800 lb. (machine guns)	1915 lb. (machine guns)
.....	French-built Hispano Nene	Rolls-Royce Nene
hrust, at rpm...	5000 lb.	5000 lb.
.....	34.9 ft.	41.6 ft.
.....	49.2 ft.	35.1 ft.
ea	270 sq. ft.	256.9 sq. ft.
d, sl...	645 mph.	600 mph.
limb, sl.	5910 fpm.	7800 fpm.

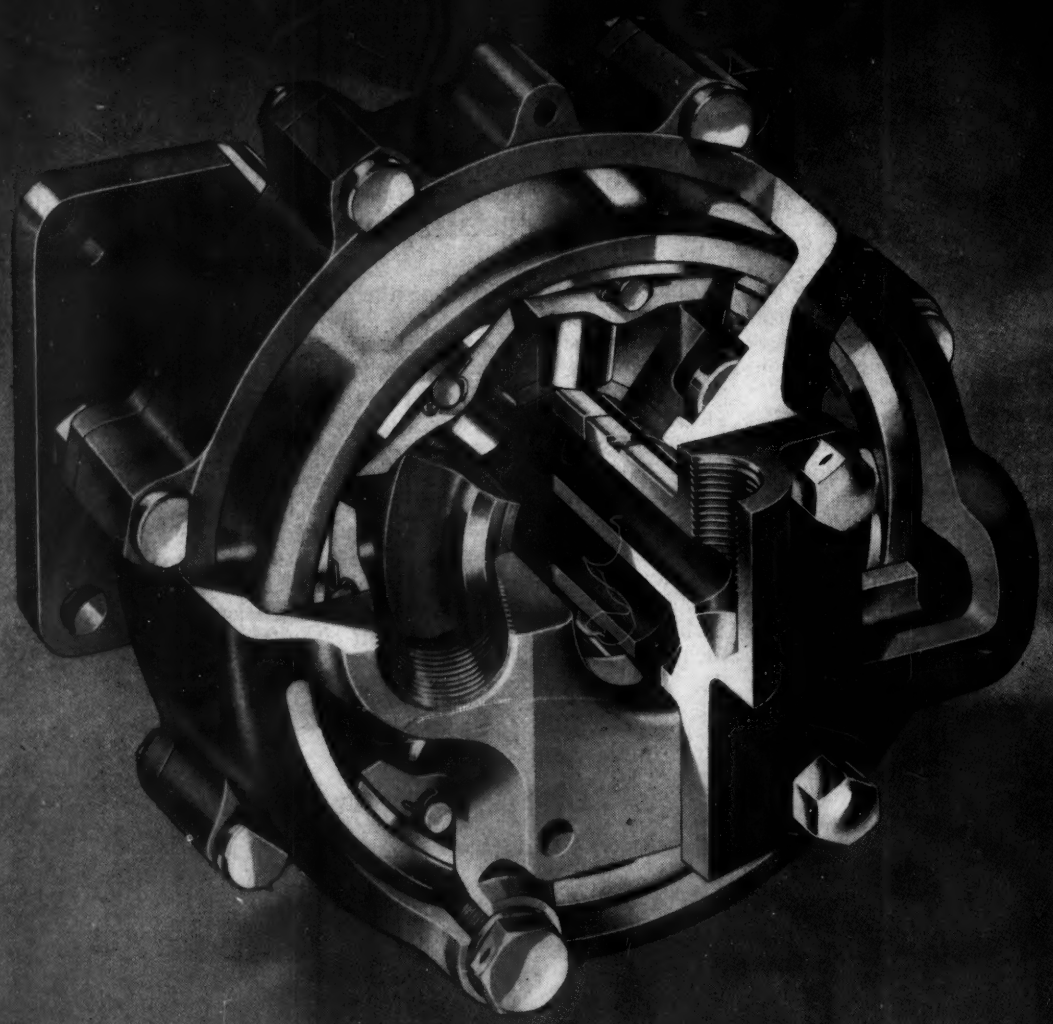




DOWTY

Fuel Pumps

for Gas Turbines



DOWTY CORPORATION · 25 BEAVER STREET · NEW YORK 4 · N.Y.
DOWTY EQUIPMENT LIMITED · CHELTENHAM · ENGLAND
DOWTY EQUIPMENT (CANADA) LIMITED · 999 AQUEDUCT ST. MONTREAL 3. CANADA

Balliol Development Work to Continue

(*McGraw-Hill World News*)

LONDON—Testing of the Boulton-Paul Balliol II (advanced military trainer with Merlin engine) has continued despite the crash at Wolverhampton on Feb. 3 which killed both the chief test pilot, Robert Lindsay Neale, and his assistant, Peter Tisshaw (AVIATION WEEK, Feb. 21).

The plane which crashed was the first of the Merlin-powered versions. Second of this type has been flying for some time at the Ministry of Supply testing ground at Boscombe Down. A third plane is just about ready to fly.

A so-called pre-production order for a small number of these Balliols (about 25) is being turned out at Boulton-Paul's Wolverhampton factory. RAF has loaned them a test pilot for the company's own testing program.

▶**No Ground Lost**—It appears that Boulton-Paul will not necessarily lose ground in their "competition" with the AVRO Athena to see which gets the nod from the RAF as its advanced training plane.

However, loss of the accumulated flight experience of the two pilots is undoubtedly a serious one.

Coroner's inquest on the crash proved inconclusive. Parts of the plane's windscreen were found a short distance from the plane, leading to the guess that the plane had collided with some object such as a bird, and that the splintered windscreen had caused the pilot to lose control.

New Extinguisher Small, Yet Effective

A new, high-efficiency fire extinguisher known as the "1-2-3" has recently been developed for aircraft use by the Boka Mfg. Corp., 1226 Bankers Securities Building, Phila., Pa.

Small size, simplicity and ruggedness characterize the unit. Overall length is $6\frac{7}{8}$ in., diameter $1\frac{1}{2}$ in., and total weight, installed, 13 oz., making it easy to mount and maneuver. Discharge nozzle is $\frac{1}{2}$ in. long, beaded near the tip to produce a conical discharge pattern for optimum coverage.

No pumping mechanism is required because contents are self-expelling. Discharge valve is a simple, needle type, actuated by a knurled knob and high-pitch screw thread. The heavy gage brass shell has a burst point of 300 psi.

Primary purpose of this device is to extinguish incipient fires—before they develop to the point of requiring large and cumbersome fire-fighting equipment. It would be particularly useful to snuff out fires in electrical circuits, interior trim or upholstery immediately upon detection. The manufacturer states that, while the "1-2-3" may be used for all types of fires, it is especially effective on Class B fires (flammable liquids).

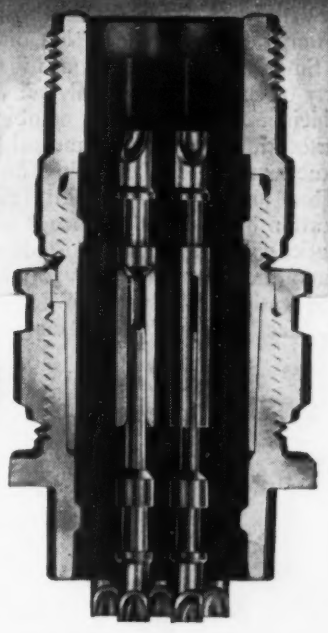
The extinguishing agent is a blend of methyl bromide and freon, which provides effective fire-killing ability down to temperatures below 0 F. This mixture is also purported to be much more efficient than other common types of extinguishers from a volumetric standpoint, since much less agent is required for a given job. This feature also materially reduces toxicity, because amount of agent expelled is insufficient to cause discomfort or injury to people in the immediate vicinity.

In this connection, it is significant to note that all non-aqueous extinguishing media are toxic, including carbon dioxide; moreover, the products of combustion of any burning material are also toxic. Therefore, since a fire and its poisonous gases must be combated with another toxic material, it is imperative that this substance work rapidly.

BENDIX-SCINTILLA

ELECTRICAL CONNECTORS

the finest money can buy!



THESE ARE THE FEATURES THAT HAVE MADE IT *the* QUALITY CONNECTOR

- Moisture-proof, Pressure-tight
- Radio Quiet
- Fewer Parts than any other Connector
- Contacts filled with high-grade solder to insure top performance
- Single-piece Inserts
- High Arc Resistance
- Easy Assembly and Disassembly
- Vibration-proof
- Light Weight

Write our Sales Department for detailed information.

Plus this Important Advantage—

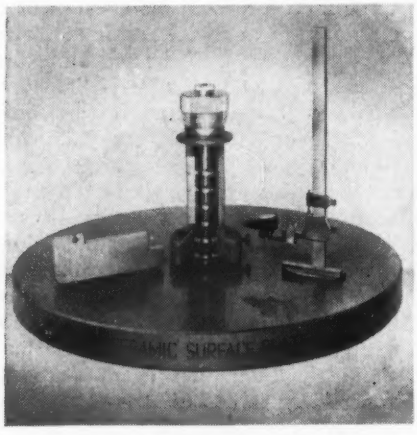
PRACTICALLY NO VOLTAGE DROP! Contacts that carry maximum currents with a minimum voltage drop are only part of the many new advantages you get with Bendix-Scintilla* Electrical Connectors. The use of "Scinflex" dielectric material, an exclusive new Bendix-Scintilla development of outstanding stability, increases resistance to flashover and creepage. In temperature extremes, from —67° F. to +300° F., performance is remarkable. Dielectric strength is never less than 300 volts per mil. Bendix-Scintilla Connectors have fewer parts than any other connector on the market—and that means lower maintenance costs and better performance.

*TRADEMARK

BENDIX SCINTILLA

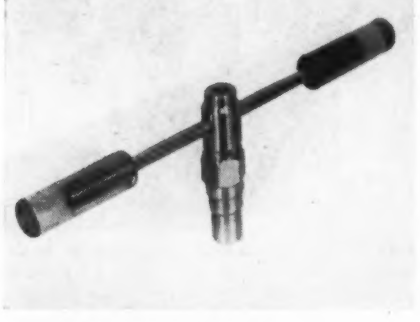
SCINTILLA MAGNETO DIVISION OF SIDNEY, NEW YORK

NEW AVIATION PRODUCTS



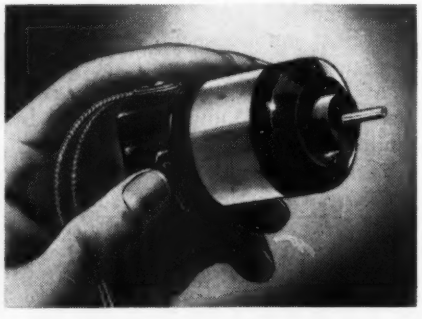
Precision Checker

Ceramic surface plate made by **Norton Co.**, Worcester 6, Mass., for use in toolrooms and inspection departments where precision setups and measurement checking require high degree of accuracy, affords these advantages: Extreme wear-resistance, precise flat surface guaranteed within .0001 in., and continuously smooth surface finish. It's claimed that laboratory test shows greatly extended plate life. Exhaustive field trials are stated to reveal almost complete absence of wear to plate or gages and instruments used on it, together with freedom from plate warpage, expansion troubles, or deflection under load. Smooth semi-glossy surface is not slippery or sticky and is highly suitable for blueing. Precise flatness combined with exceptional plate smoothness shortens time required to take readings on an indicator, and accuracy permits exact duplication of readings. Device is nonmagnetic, will not sweat or corrode under atmospheric conditions, and may be cleaned easily with soap powder and water. Sizes are 5 to 24 in. in diameter.



Non-Marring Studder

Combination stud driver and extractor, "Bi-Way," intended for speeding production, maintenance and repair, is distributed by **Air Associates, Inc.**, Teterboro, N. J. Device is claimed never to mar threads. With shift control pin set in driving position, unit operates as normal collet type stud driver and affords these features—stud depth into collet is fully adjustable without disassembly of tool; extension drive, inserted in torque wrench hole, permits deep or shoulder driving where space is insufficient for standard handle bars; standard collet may be replaced with any other, within range of studder, in 30 sec.; with handles removed, it becomes power tool for use with impact, air, or electric wrench. With pin set in pulling position, it will extract any stud able to withstand necessary torque. Collet clamping action increases directly to torque starting the stud.



Size Stressed in Servo Motor

Designed specially for aircraft instrument operation, new d.c. subminiature type servo motor weighing only 8½ oz. and delivering 1/500 hp., receives current from plate circuits of vacuum tube amplifier. Made by **Holtzer-Cabot, Inc.**, 125 Amory St., Boston, Mass., unit RBDS-0810 is only 1⅝ in. in diameter and 2 1/16 in. between hubs, and operates on field current of 6 milliamp., with stalled armature current of .8 amp. Operating range is from sea level to 40,000 ft. covering temperature variations from −65 to 160 F. Maximum speed is 14,000 rpm. Motor has two independent high impedance field windings for reversible operation, hermetically sealed in metal. Armature is operated from separate d.c. source, and to obtain maximum sensitivity compatible with reliable operation, air gap between armature and field is extremely short. Example of one operating scheme—two field windings are connected into two plate circuits of push-pull amplifier. When two plate currents are in balance, motor is at rest, but when currents are unbalanced, motor will run in a direction and at a speed depending on degree of unbalance.

Sparkplug Cleaner

Designed to fill needs of large production shop or small airport repair station, "Abrasive Blast Cleaner," Model M811, made by **B. G. Corp.**, 136 West 52 St., New York 19, N. Y., removes carbon and lead deposits from nose and shell of sparkplug in single, simple operation. Unit contains built-in filter to avoid hazard of scattering abrasive dust, and only requires connection to standard compressed air line. One valve controls abrasive blast and another controls air blast for blowing abrasive out of plug. Special offset adapter is available for cleaning of long reach platinum electrode plugs. Company's abrasive compound is made from aluminum oxide.

Helps Ground Maneuvers

Automatic, full-swivel, steerable tail wheel unit, Model 3200, specifically designed for Stinson and other four-place aircraft, is announced by **Scott Aviation Corp.**, 207 Erie St., Lancaster, New York. The 8-in. wheel assembly, with pneumatic tire, is represented as solving tricky taxiing problem encountered on rutty fields or in strong crosswinds. It goes into full swivel only when pilot desires—by applying brake to one wheel sufficiently to pivot ship, forcing assembly beyond rudder travel. Action in hangar is by pushing tail sideways.

Dependable

CHAMPION

America's Favorite Spark Plug

C26—
Unshielded
Actual Size 2⅜"

R 37 S-1
Actual Size
Shielded Type

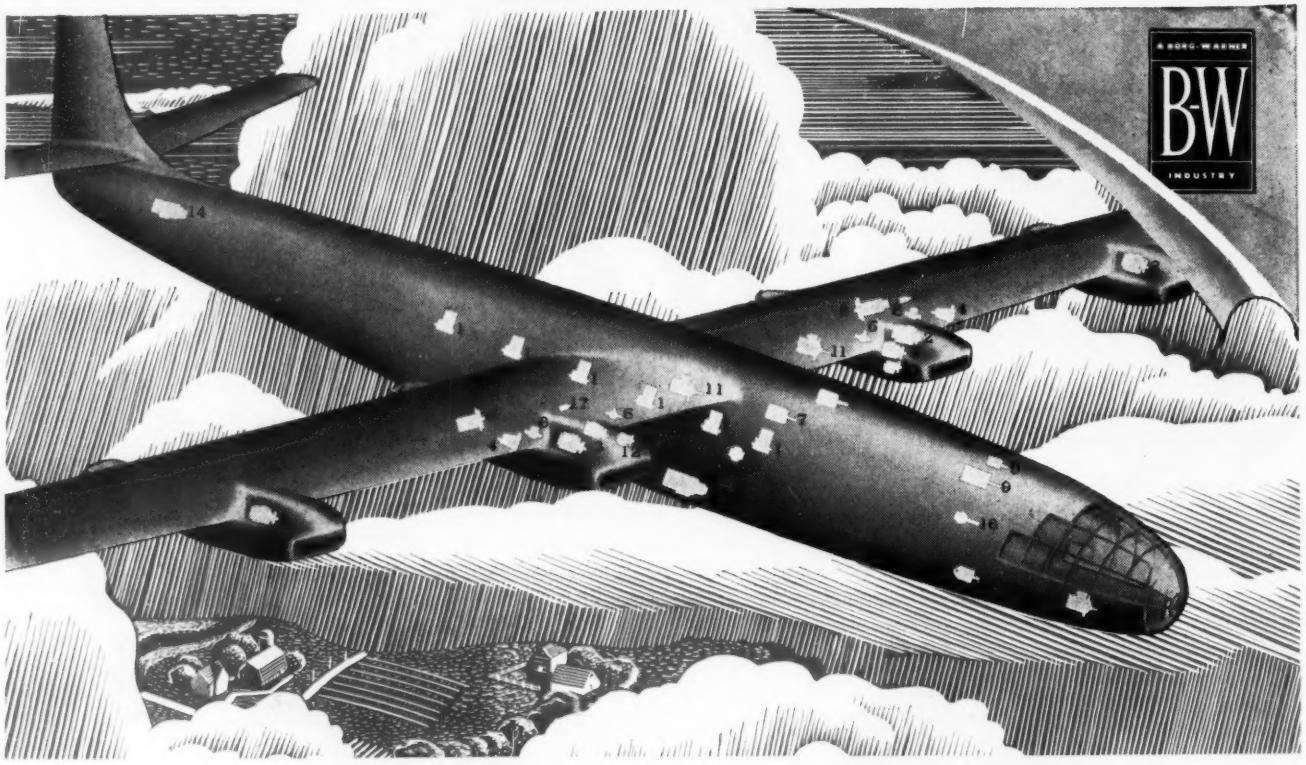
HERITAGE

Champion Ceramic Aircraft Spark Plugs are not only products of specialization, but also beneficiaries of the richest heritage in the spark plug field. Champion produces spark plugs exclusively and has attained leadership because every single Champion Spark Plug—aircraft, automotive or otherwise—is backed by unequalled research, engineering, manufacturing facilities and EXPERIENCE THAT HAS NO PARALLEL. Champion Spark Plug Company, Toledo 1, Ohio.

Listen to the CHAMPION ROLL CALL... Harry Wismer's fast sportscast every Friday night, over the ABC Network

USE CHAMPIONS

AND FLY WITH CONFIDENCE



In Jets, too*, there are 36 places where Pesco PRECISION Equipment gives Positive Performance

Positive performance has always been a "must" for aircraft equipment. It's a major reason why Pesco precision fuel and hydraulic products have long been standard equipment on reciprocating engine planes.

Today, the jet plane, with its higher speeds and consequently greatly increased fuel pressure and capacity requirements, has placed even more emphasis on positive performance.

To meet these new conditions, Pesco has developed for jet planes such vital equipment as the high-pressure fuel pump . . . the pump that is really two pumps in one so that if the main pump fails, another pump automatically goes into operation to keep fuel flowing continuously. So important was this development, that America's leading builders of jet engines have standardized exclusively on this Pesco high-pressure fuel pump.

Altogether, there are 17 Pesco products that can be used in 36 places, on jet planes. They are listed at the right.

Working hand in hand with the aircraft manufacturer's own engineers, Pesco has kept constant pace with aviation's rapid advances. It is experience and "know-how" that can be of real help to you. Take advantage of it.

*On reciprocating engine planes there are also 36 places where Pesco precision equipment is used.

KEY TO PESCO EQUIPMENT

1. Fuel Booster Pumps (6)
2. High-pressure Fuel Pumps—Engine-driven (4)
3. Vacuum Pumps (2)
4. Oil Separators (2)
5. Suction Relief Valves (2)
6. Pressure Relief Valves (2)
7. Electric Motors for Cabin Ventilators (2)
8. Landing Gear Operation:
   a. Engine-driven Hydraulic Pump System
   b. Electric Motor-driven Hydraulic Packages
   c. Electric Motor Actuators
9. Electric Motors for Cabin Heaters (2)
10. Motors for Blowers to Remove Wing Gases (2)
11. Windshield Defroster Blower Motor (1)
12. Engine-driven Hydraulic Pumps (2)
13. Motor-driven Emergency Hydraulic Pump (1)
14. Motor-driven Surface Booster Pump (1)
15. Hydraulic Flow Equalizer (1)
16. Hydraulic Pressure Reducing Valve (1)
17. Hydraulic Pressure Relief Valves (2)

Pesco PRODUCTS DIVISION
BORG-WARNER CORPORATION
11610 Euclid Ave. - Cleveland 6, Ohio
MANUFACTURERS OF BW SUPERCHARGERS

The Election of November 2, 1948 GAVE NO MANDATE FOR SOCIALISM

The President and those who support his legislative program have objected to the substance of my previous editorial, which appeared under this headline: "Now is the Time to FIGHT SOCIALISM in Washington."

In that editorial I explained how Washington is poised to follow the disastrous policy of forcing industry to skimp on new plants and new equipment. That policy landed Britain in the numbing embrace of the Socialists. I cited the experience of Britain to show how such skimping on industrial tools can bring a nation to economic stagnation . . . and Socialism.

The President, in his recent Jackson Day speech, brushed aside this warning . . . "They are again trying to frighten the people with the old worn-out bugaboo that Socialism is taking over in Washington." Senator Francis J. Myers of Pennsylvania asserted that I was guilty of "warfare against any reasonable effort to keep our system of free enterprise working."

These criticisms may be sincere. But they are not well-founded.

I want to show why they are not well-founded by basing this editorial on Washington rather than Britain.

In Washington the Administration has proposed a legislative program, the key parts of which would clearly put the country far on the road to Socialism. Let us see how.

There are two steps in the process:

FIRST: The government by its taxation program undermines private industry so that it cannot provide itself with the necessary new plant and tools.

SECOND: The government itself steps in to provide the plants and equipment that it has blocked industry from getting. *That is Socialism.*

Here is how Washington is promoting Socialization of the steel industry—and of other industries.

Steel has been expanding its capacity and improving its equipment chiefly by plowing back its profits. During the last three years it has spent $1.4 billion for new plants and new tools. That was more than the companies had available from their own earnings. But profits provided more

continued on next page

than half of that money—more than $700 million. The remainder came from loans and from depreciation reserves set aside out of the earnings to replace worn-out equipment.

Profits must continue to provide the funds needed to pay for the bulk of the steel industry's necessary expansion. That is because private citizens, their income slashed by heavy taxes, have not been willing to buy steel stocks even at prices ruinously low for the companies and their present stockholders. The stock market currently prices the mills and other facilities of the nation's principal steel-producing companies at far less than fifty percent of the cost of reproducing them.

Let us take another example. Profits are essential to expansion in the electric light and power industry also. This year private companies are planning to buy $2 billion worth of new plant and equipment. To do that without going overboard in debt, they must sell to the public some $300 million worth of common stock. A squeeze on their profits would make that sale virtually impossible.

For tens of thousands of small business enterprises profits afford virtually the only practical source of funds for new equipment and expansion.

In the face of these and many other examples that might be cited, what is the most effective way to prevent industry from re-equipping itself and expanding is capacity to meet our essential needs?

Obviously, it is to cut down profits. And that is what the Administration is trying to do. The President has declared that steel prices are too high, and is demanding that Congress raise taxes sharply on all corporations.

There you have the first step toward socializing industry.

Next comes step two. Have the government supply the tools and equipment which, by taxation, it prevents industry from getting.

The Administration has proposed legislation to carry out this second step. It is called the "Economic Stability Act of 1949," for short, the "Spence Bill."

This bill gives the President the power to provide industrial facilities—in steel, power or any other industry—where he finds that a shortage is hampering or is likely to hamper the economy.

True, the bill says that the government is not to construct new plants if private companies will do it through government loans, on terms prescribed by the President. That may be just one step short of complete socialization. But it is only a short step. And the Spence Bill authorizes the government to take that step.

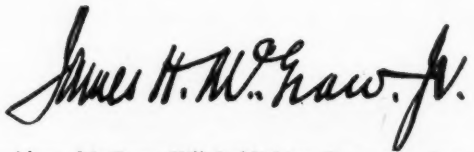
By itself, the Administration's "Stability Act" sounds harmless enough. It would have the government build plants only as a last resort. But it provides also that if private enterprise cannot turn out all the goods the country needs, the government can and should step in and provide the equipment to do it.

Now, take that power together with an Administration tax program that undercuts the ability of private enterprise to supply the new plants and equipment it needs out of its own earnings. That combination promotes government ownership and operation of industry.

And that is Socialism.

The American people, of course, have the right to live under any system they choose—Capitalism, Socialism, Fascism, Communism, or what-have-you. But before Socialism or any other "ism" is imposed upon us from above, the people should know the facts. If this editorial shall have contributed in some small degree to that end it will have served its purpose.

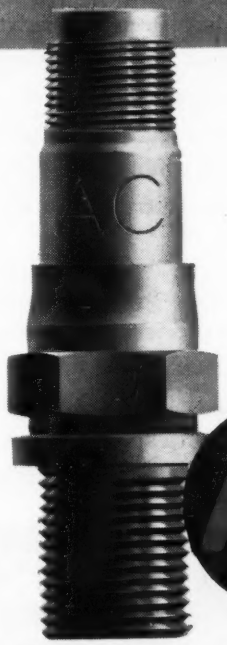
The election of November 2, 1948 gave no mandate for Socialism.



President, McGraw-Hill Publishing Company, Inc.

AC SPARK PLUGS fired Globe-Girdling B-50

224 TYPE AC-181 AIRCRAFT PLUGS, WITH PATENTED *CORALOX* INSULATOR, TOOK USAF BOMBER 23,452 NON-STOP MILES IN 94 HOURS.

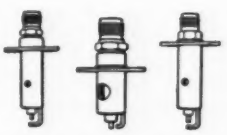


AC salutes The Air Force, and especially the skipper and crew of "Lucky Lady II", for the stupendous accomplishment of February 26-March 2, 1949.

It is difficult to imagine a more severe test of men, organization, planes, and engines than this non-stop sensation. It would be equally difficult to imagine a more successful conclusion.

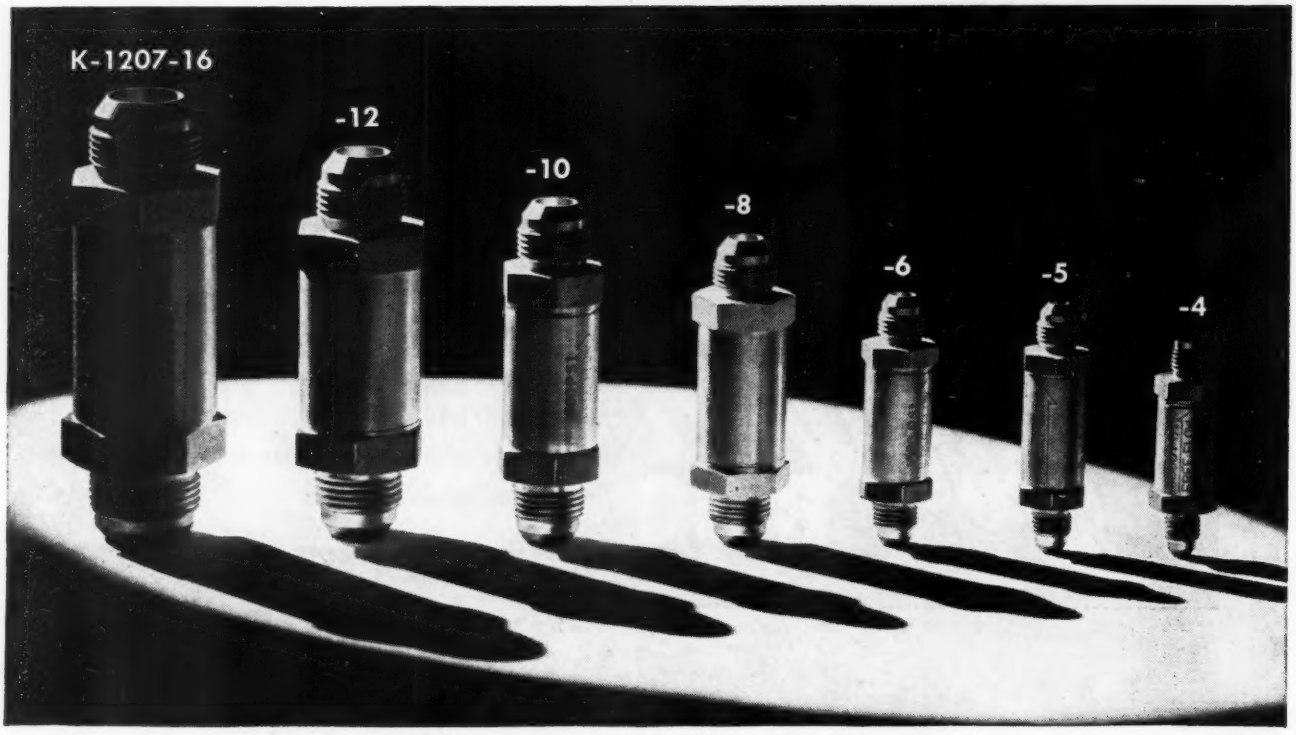
AC is proud that its aircraft spark plugs met the need.

AC AIRCRAFT SPARK PLUGS



AC Plugs for jet engines have also participated in the establishment of many speed records.

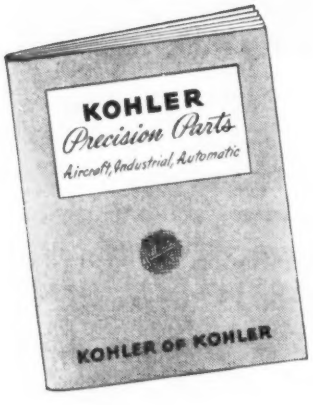
AC SPARK PLUG DIVISION • GENERAL MOTORS CORPORATION • FLINT, MICHIGAN



Valves shown are "AN" approved and conform to AN-V-5d (1) and drawing AN-6207.
Cone type, check valves illustrated have an operating pressure up to 1500 PSI. with a burst pressure of 3750 PSI. Excellent for use with hydraulic fluids, gasolines, oils, water, and acids non-corrosive to aluminum.

Specify KOHLER CHECK VALVES

for long service life without maintenance



THE complete line of Kohler Precision Parts includes check valves for installation on aircraft. Leading manufacturers specify Kohler valves for lines using hydraulic fluids, gasolines, lubricating oils, aromatic fluids, air, vacuum, water, acids, chemicals, etc.—and requiring a *pressure regulating valve, pressure relief valve, vacuum breaker, restrictor check, check valves with high or low opening pressures or check valves for special applications.*

All major types, cone, soft seat, and swing checks, have been developed to meet rigid service requirements. The superiority of Kohler designs and precision manufacturing processes have been demonstrated by valves in actual use. Kohler valves have quick opening and positive closing without poppet chatter or leakage. When they are open, free flow is maintained with minimum pressure drop.

Kohler engineers will gladly cooperate in developing precision parts for your special requirements. Write for our new catalog, showing the full line of Kohler Precision Parts, with specifications, engineering data and useful information.

SEND FOR THIS CATALOG TODAY

KOHLER CO., Dept. 23-J, Kohler, Wisconsin
Please send your new Catalog to:

Name .....

Company .....

Address .....

KOHLER OF KOHLER

PLUMBING FIXTURES • HEATING EQUIPMENT • ELECTRIC PLANTS

LETTERS

Contracts for Small Planes

We read with considerable interest the article, "Small Business Told to Get Arms Work," in your recent issue, and venture to suggest that you contact Robert Patterson, former Secretary of War (who was quoted), to find where any of this work on the rearmament program has been placed.

We have been ready and waiting for the past year for business to develop from the aviation industry, but so far have not been able to see any in sight, even in the distant future.

We were amazed on a recent trip to Wright Field to see if there was possibility of orders coming through for any of the tools which we make, and we made the same tools during the last war. We saw hundreds of vacant desks and only a small handful running things in the materiel procurement section.

We were also informed that all of the money had been spent that had been appropriated for the USAF. We certainly would like to know the system for spending billions that fast . . . and how we could get a very small part of just one billion . . .

It might be very interesting if you would undertake to find where any of this airplane business has been placed. The small fellow might be able to figure on some; the only business that has been placed according to all available trade paper reports has been with the few big airplane manufacturers . . .

On other items in the rearmament program there has been little if any activity in the placing of ordnance, guns, or any tank contracts to the best of our knowledge. The only phase of the so-called rearmament program which has showed any sign of activity whatever has been with the shipyards and this has centered around tankers almost entirely.

So far, all that the small manufacturers have heard about orders for rearmament has been a lot of talk . . . We honestly believe that with the stagnation that seems to exist since the election in the small metal working shops all over the country, we will soon be fighting the biggest wave of bankruptcy among small business firms and plants that this country has ever seen.

If this sounds cynical and pessimistic, please be advised that we do not have a crystal ball and are not given to wishful thinking, but are facing plain facts—no orders coming in, no orders going out, and no money deposited to our bank account.

Charles A. Koza
Invincible Tool Co.
422 Empire Bldg.
Pittsburgh 22, Pa.

Roadable Lightplanes

Referring to your article, "Ercoupe Can Be Made Roadable" in your Feb. 21 issue, this is the type of thinking, planning and developing the lightplane industry needs if it is ever going to rise above its present low state. It's a sad commentary on the industry as a whole when this important progressive development work has to be undertaken by a fixed base operator while the manufacturer merely comments that he sees some problems yet to be solved and lets the other fellow carry the ball.

This is the most practical approach to take toward this problem of roadability. So far all other proposals have been way off course. What the private flyer needs is not a utility automobile that his wife drives all week and he takes to the airport on Sunday, hooks on the wings and takes a flight around town. We don't need a high performance automobile that can be made to fly on occasion. What we need is a high performance airplane that can fold its wings and proceed on the ground for moderate distances at reasonable speeds.

The utility of the lightplane is most seriously limited by getting weathered in for a day or two away from home. Many a time it would be possible to proceed on the ground for 50 to 100 miles and find clear skies. With the Ercoupe described in your article this would be entirely in the range of possibilities. Also, more trips could be planned for week days if it were possible to take off after work, fly two or three hours before sunset, then land, fold the wings and complete the trip on the ground.

This feature would promote safety in flying too. No longer would it be necessary to forge ahead in questionable weather. You could land and proceed on the ground until conditions improved.

Again, this is what the lightplane industry needs. What can we do to shake them out of their hide-bound ways and start them down the road to progress and prosperity?

J. H. Fletcher
Avon Aircraft Company
2323 Miles Road
Cincinnati 31, Ohio

Praise From Slick

In recent months you have not left much time between occasions for our expressions of appreciation of the things for which Aviation Week stands.

I am referring now to your editorial of Feb. 14. ("Nonskeds and The News.") Please accept again our thanks and appreciation for what, from our point of view, is fair, impartial, and actually courageous reporting.

I have said in letters to you before and I say again, that it is truly gratifying to know that there are people in objective and unbiased positions who see so clearly as you apparently do the many facets of this continuing battle between the certificated carriers and all other types of air transportation. It has always been interesting to me, and I am sure also to you, to see, almost without exception, that every time a new-comer offers a new idea, good or bad, and attempts to render to the public a service obviously neglected by the vested interests, he draws nothing but criticism and battle from the certificated airlines. If, by some chance, the certificated airlines were to win all the present battles, I think you would agree that we would have in air transportation a very unhealthy situation.

Lewis J. Moorman, Jr., Executive Vice President
Slick Airways, Inc.
San Antonio 9, Texas

Temco's Trainer

. . . All of us were delighted with the clear-cut story (Temco Unveils Primary Trainer) published in Aviation Week. We wish all publications of this kind were as clear, as accurate. I would also like to congratulate you on your very excellent publication. I look forward with keen interest each week to Tuesday morning and generally put aside reading all other mail until I have at least glanced through the various articles . . .

Robert McCulloch, President
Texas Engineering & Mfg. Co., Inc.
Dallas 2, Tex.

He Blames Insurance

. . . Most of us are anticipating expansion of business and professional flying as time goes on, but as in all progress, there are nasty little bottlenecks which must be overcome one by one as they are uncovered. To accelerate the expansion of this type of flying, it might be well to pass the word along when we uncover one of these obstacles, so that those interested, such as people selling aircraft, can dig in and come up with a solution.

A close friend of mine, who is a field representative for a large firm, has a nice new shiny Cessna hangared at an airport a mile from his home. Until recently he covered his area, a radius of about 700 miles, in a manner most of us envy. Now his company has turned thumbs down on all business private flying. The reason: insurance! The company thinks it could become liable for damages amounting to seven figures.

It was possible for this fellow to leave the house at 7 and be with a customer 300 miles away at 10. Now he must resort to the old ordeal of sleeping the night away on a Pullman to make the same appointment.

So you see, this little obstacle of insurance makes the difference between kissing your wife goodbye at 7 in the morning or at 10 the night before. This, I contend, is a threat not only to business flying, but to the next generation of business flyers.

Who has the answer?

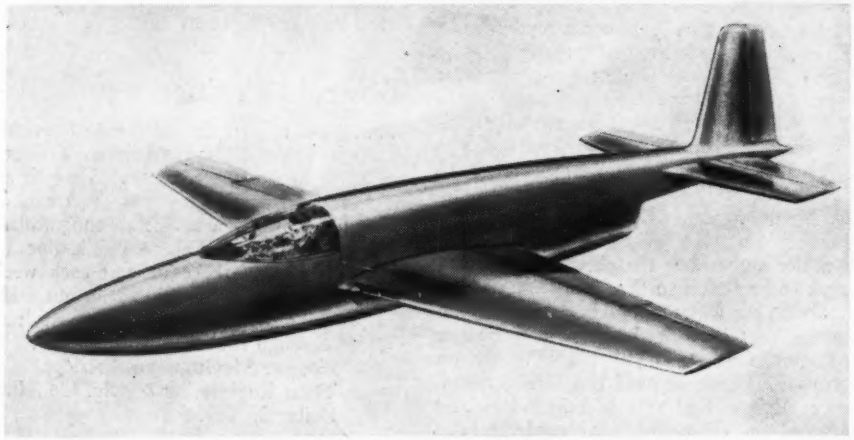
Larry Armor
7404 Philadephia Rd.
Baltimore 6, Md.

"Entirely Accurate"

. . . Naturally I was very pleased with the excellent treatment that you gave the Pakistan training program and our Jacksonville base Mar 7. All the points covered by you certainly seem to be entirely accurate, aside from the story being very well written and very complimentary. . . .

Beverly Howard, President
Hawthorne Flying Service
Charleston, South Carolina

SALES & SERVICE



Artist's sketch of West two-place personal plane design, powered by small twin jets, shows new trend. First consumer test of small civilian jet planes may come in National Air Races of next few years. Craft can be produced to sell for $7000.

New Jet Personal Plane Design

Possibilities studied by West Coast firm; baby turbojet engine shows up to 318 lb. thrust on test stand.

An experimental two-jet, two-place personal plane design which would give 400 mph. top speed and 375 mph. cruise at 12,000 ft. with a range of 500 mi., according to preliminary calculations, is being studied by West Engineering Co., Los Angeles.

Design is an advanced development of the earlier West design of a small two-jet plane with lower performance characteristics.

▶ **Race Pilot Reaction**—Eastman Jacobs, consulting engineer credited with major development of the laminar flow wing, is reported interested in sponsoring the plane project. If the proposed design is built, first units may be turned over to National Air Race pilots to test their buyer reaction, and to prove West's baby turbojet engine which has shown up to 318 lb. thrust on test stand.

As shown in the artist's sketch, projected plane will have a relatively thin wing structure and low-drag fuselage section with pilot and passenger side by side in seats having staggered placement to avoid shoulder crowding in the narrow cabin.

Design specifications show the plane to weigh 2750 lb., gross, with 1050 lb. of this weight representing fuel load. Aerodynamic cleanliness of the design is expected to give a 20-to-1 glide ratio.

▶ **Specification**—Ed West, president of West Engineering, cites among other specification figures: 2300 ft. takeoff over 50 ft. obstacle at sea level on normal day; 2500 ft./min. climb from sea level; 66 mph. stall with flaps; 80 mph. stall with flaps retracted; 70-75 mph. landing speed; 21 lb./sq. ft. wing loading at landing with normal fuel reserve. Powerplants are two West Engineering Co. turbojets developed from Type B turbo supercharger. Power from both will be indicated only for takeoff and climb, after which cruise will be on one engine.

In support of seemingly optimistic performance expectations, West claims that the design enables the finished aircraft to be considerably cleaner, from standpoint of drag, than the F-80. He told AVIATION WEEK: "The high takeoff performance, and high glide ratio will be such that the takeoff 'danger period' (from engine failure) reduces to as little as three and one-half seconds with the plane in the hands of a competent pilot."

Members of West's company are confident that the little plane can be produced to sell for as little as $7000. Airframe, minus accessories, should not cost more than $2400, applying the $3/lb. rule-of-thumb to a bare airframe weight of 800 lb.

▶ **Question Mark**—An obvious question mark in the projection of such a plane is engine life and engine purchase cost.

West is in the experimental phase of converting superchargers (he holds a contract to acquire 6000 Type B units owned by a Los Angeles war surplus broker) into engines, and no estimates are available on conversion costs or life of the finished product.

While West Engineering's chief objective has been, and still is, the development of a baby turbojet unit to power high-speed Army and Navy radio-controlled target planes, the designing of the personal airplane has been given impetus by interest of several race pilots who have been participants in the Goodyear Trophy midget plane races at Cleveland.

One race pilot has told West that he expects that the 1949 National Air Races will be the last to stage Thompson Trophy races for planes of unlimited power in piston and jet classes. He believes that after 1949 races, as in the case of the highly popular Goodyear race, will be for aircraft in various power groups and including jets. He informed West that race pilots are considering seriously several plane designs built around the Boeing and Westinghouse baby turbos as well as West's own engine.

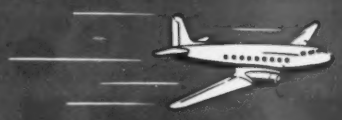
An interesting sidelight of West's engine experiments is his testing of one baby turbojet as an orchard heater for use in frost belts. Preliminary experimental runs indicate that the engine will produce 1,250,000 BTU of heat per ten gal. of fuel as compared with 500,000 BTU delivery from the same quantity of fuel in a "good" standard orchard heater. In tests as a heater the engine is run at 8000 rpm., at which speed the noise level is described as "not disturbing."

Portland to Portland

The seventh annual light plane air tour of the Portland Chamber of Commerce will take a large group of Oregon business and professional men from Portland, Ore., to its eastern namesake city, Portland, Me. From 80 to 100 privately owned planes will take off May 21 on the trip, to be made in leisurely stages, with stops at Boise, Idaho; Salt Lake City, Utah; Denver, Colo.; North Platte, Neb.; Wichita, Kan.; Indianapolis, Ind.; Akron, Ohio, and Lock Haven, Pa. Arrival at the Maine metropolis is scheduled for May 27.

Visits will be made to aircraft manufacturing plants at Wichita and Lock Haven, where some of the air tourists will take delivery on new planes. No fixed schedule has been arranged for the return trip, each flier being at liberty to choose his own route home. Many of the fliers plan to be in Indianapolis May 30 to see the 500-mi. automobile racing classic.

This will be the longest tour undertaken by the chamber, although previous tours have included trips to Alaska and Mexico.



Exide

AIRCRAFT BATTERIES

For long, dependable service

Exide aircraft batteries reflect 61 years of battery building experience, plus a long, close association with the aviation industry since its early days.

Exide Aircraft Batteries give you high capacity with minimum weight. Their rugged construction assures long life. Many exclusive features combine to provide safe, dependable performance with maximum economy.

Write for copy of Exide Aircraft Catalog, which includes the Exide Battery Price and Replacement Data Sheet.

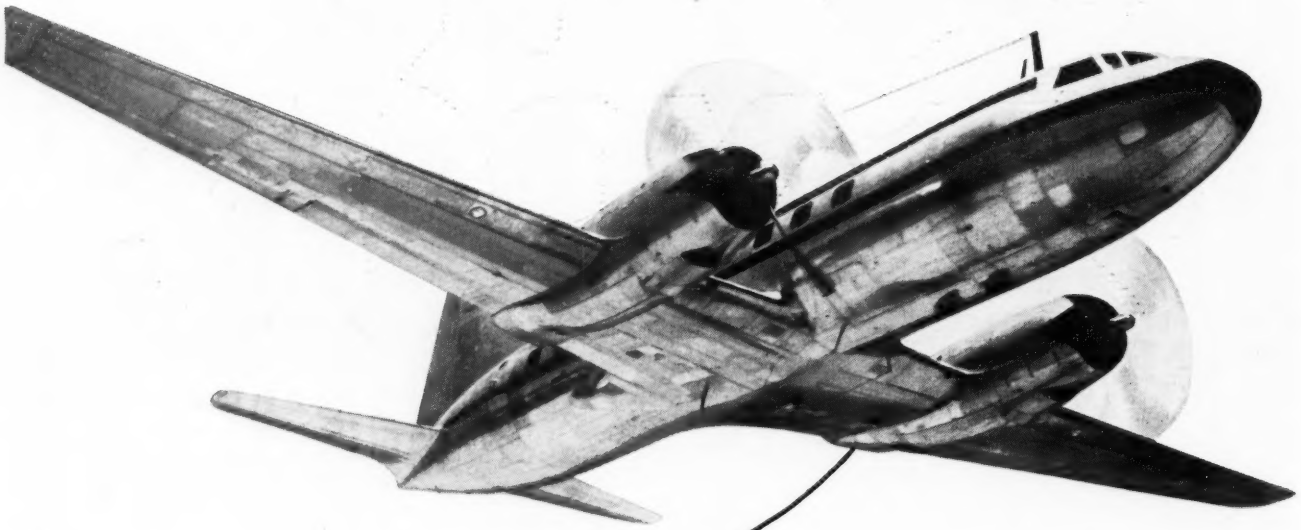
"Exide" *Reg. Trade-Mark U S. Pat. Off.*

1888
DEPENDABLE BATTERIES FOR 61 YEARS
1949

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • *Exide Batteries of Canada, Limited, Toronto*

THE 12*th GREAT AIRLINE GOES

Convair



Northeast Airlines is the twelfth major carrier to purchase "The World's Most Advanced Medium-Range Airliner"— the Convair-Liner. Northeast has contracted for five.

No other twin-engine airliner in commercial use equals the pressurized Convair-Liner for comfort, speed, economy of operation, and economy of maintenance.

Consolidated Vultee Aircraft Corporation
San Diego, California • Fort Worth, Texas

BRIEFING FOR DEALERS & DISTRIBUTORS

MORE COMPETITIONS?—Story about the Albuquerque competition between Navion and Bonanza on short takeoff and landing characteristics (Aviation Week, Mar. 21) is beginning to stir up additional controversy among other Bonanza and Navion owners and dealers as we rather suspected it might.

Before it finishes there may be a few additional contests. For example: E. Merritt Anderson, Beech distributor, writes from Milwaukee: "Boy, you sure started something. I still don't believe it. I would be very eager to participate in a like contest here at this field (General Mitchell Field, Milwaukee)." And so, let the line for competitors form on the right.

JORDAN FOR MAITLAND—Tom Jordan, deputy director of Wisconsin Aeronautics Commission, is acting director following resignation of Col. Lester J. Maitland, who has accepted a post as Michigan Aeronautics Director. It is understood that Maitland's salary in his new post is $10,000, approximately double his Wisconsin salary.

CITY HELICOPTER ORDINANCE—Buffalo city law department has drafted an ordinance permitting helicopter landings and takeoffs within the city limits, for submission to and action by the city council.

Proposed amendment to existing laws, modifies a 1000 ft. minimum altitude limitation, providing that helicopters may be flown at lower altitudes and make landings at safe places designated by the parks commissioner. Amendment provides that operations must be conducted without hazard to persons, property or other aircraft, without undue interference to use of property, and at altitude which will permit emergency landing without undue hazard.

Amendment authorizes board of safety to prescribe routes and minimum altitudes over the city, and outlaws parachute jumps except in emergency, and prohibits careless or reckless operation in manner contrary to state and federal regulation. The ordinance will be studied closely by helicopter operations as one of the first of its kind.

VIBRATOR STALL INDICATOR—A vibrator motor device which warns the pilot when his plane approaches a stall attitude by shaking the control stick has been announced by Globe Industries, Inc., Dayton, Ohio.

Originally designed for use on the North American F-86 jet fighter the indicator is expected to be made available for other aircraft. Device consists of a small motor with a reduction gear which rotates an unbalanced weight attached near the base of the stick, whenever it is actuated by an attitude device. Filter is provided to eliminate radio-frequency noise. Force of approximately five lb. is used to shake the stick.

Theory of the new device is that it provides instantaneous warning to the pilot which he cannot ignore, by shaking the stick, causing him instinctively to correct his position at once.

FOOT IN THE DOOR—Fairchild Engine & Airplane Corp. intends to "keep its foot in the door" for possible reentry at some more promising time into the personal plane market, with the all-metal four-place model F-47 or some later development.

Two prototype F-47s and some employes and equipment are being transferred from the closed personal plane division at Winfield, Kan., to the main Fairchild aircraft plant at Hagerstown, Md. A small replacement parts depot for F-24 plane parts will continue at Winfield.

More than 200 of the high-wing fabric-covered F-24s were manufactured since World War II for Fairchild by Texas Engineering & Manufacturing Co., at Dallas. These were marketed from Winfield by Fairchild. During World War II Fairchild built approximately 1000 of a military version of the F-24 designated the UC-61 Forwarder.

CAA records show approximately 400 of various versions of the F-24 were manufactured from 1936 to 1940 by Fairchild. L. B. Richardson, Fairchild president, told community officials at a meeting held at Strother Field, site of the plant, that it was estimated an investment of $2 million would be required to put the F-47 on the market and that present sales prospects did not justify this expenditure.

Efforts to obtain subcontracts to keep open the Strother Field plant were discouraged by USAF authorities, he said, because of a policy of concentrating business in larger plants.—ALEXANDER McSURELY

SPECIFY DELTABESTON*

for extra heat protection

IN LIMITED SPACE

Wherever you've got to squeeze heat-beating wires into small space — get the extra heat protection of small-diameter Deltabeston aircraft wires. Three types meet all your needs for toughness and heat resistance in power and lighting circuits: synthetic resin with cotton braid — synthetic resin — and asbestos with cotton or rayon braid. All three types are built to help you beat continued high heat — to give you extra-easy installation, because they're COMPACT, FLEXIBLE, TOUGH.

COMPACT — Because the insulating materials used on Deltabeston wires pack plenty of heat resistance into small space, these wires fit easily even in the most cramped quarters.

FLEXIBLE — Workable, small-diameter Deltabeston wires can be flexed easily to fit in wherever they're needed for extra heat protection.

TOUGH — Special resin, felted asbestos, and tough braid make Deltabeston aircraft wires unusually resistant to abrasion and other abusive conditions during installation and while in service.

them wherever heat's a threat. For further information, write to Section Y15-492, General Electric Company, Bridgeport 2, Connecticut.

Deltabeston aircraft wires — in sizes 22 to 2/0 — are ready to go to work on your heat problems *now*. Specify

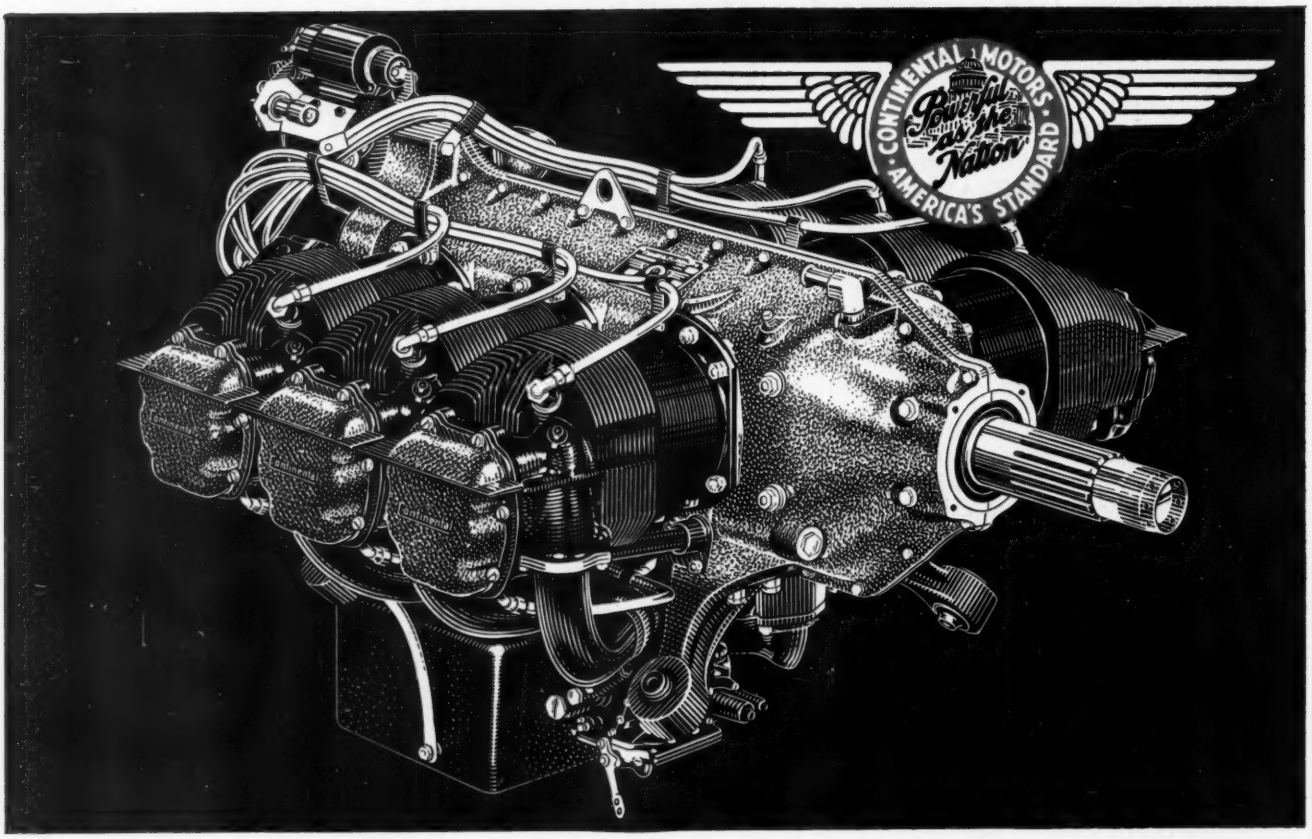
Deltabeston aircraft wires are manufactured only by General Electric, makers of the famous *triple-silicone-treated* Deltabeston aircraft wires.

*TRADE-MARK REG. U. S. PAT. OFF.

Deltabeston
AIRCRAFT WIRE
Built to beat the heat

GENERAL ELECTRIC

E185 POWERS TRANS-PACIFIC PLANE



Stock engine again proves dependability

Striking proof of the utility of personal airplanes, as well as of the hour-after-hour dependability which has made Continental engines ***fliers' first choice,*** is furnished by Capt. William P. Odom's latest record-breaking flight in a Beech Bonanza powered by a stock Continental E185.

When Capt. Odom's wheels touched the runway at Teterboro, N. J., March 8, his engine had logged some 150 hours . . . 21,000 miles of flying. In this same ship, with this same engine, less than two months before, he had shattered the over-water record for light aircraft with his Honolulu-Oakland flight.

The lengthening list of Continental firsts dates back to 1939, when a Continental "A" kept Clyde Schlieper and Wes Carroll in the air for 726 consecutive hours, the non-stop record which still stands.

Pilots remember, too, Johnny Jones' cross country non-stop flight, the E. J. Walsh national 100-kilometer speed race, the Henry Chapman non-stop New York-to-New Orleans flight, and more recently the Goodyear Trophy races at Cleveland, the Continental Trophy Race, at the Miami Air Maneuvers, and the many local events where Continental has carried off top honors.

This proven ruggedness—proven ***dependability*** — is yours not only in the E185, but also in the new C145 and the other Continental aircraft engines. And because of the volume production resulting from worldwide preference for Continental, you get it at moderate cost.

Continental Motors Corporation

AIRCRAFT ENGINE DIVISION • MUSKEGON, MICHIGAN

FINANCIAL

Airline Financial Outlook Clears

Additional mail pay awarded by CAB builds surplus for C&S, and enables UAL to whittle down deficit.

Recent mail awards granted by the Civil Aeronautics Board have made necessary a sharp recasting of previously estimated 1948 airline losses. Current release of annual reports, giving effect to increased mail pay, make much better reading than preliminary estimates had first indicated.

Along with the invigorating influences of sharply increased mail revenues are significant improvements in operating efficiencies as a result of management's own efforts.

▶ **C&S Profit**—Chicago & Southern Air Lines, among the first to issue a complete report for 1948, reveals a number of noteworthy gains. Net income came to $639,477, as compared to an adjusted loss of $276,003 for 1947.

Largely as a result of retroactive mail pay awards, applicable to 1946, 1947 and 1948, a surplus deficit of $1,581,750 was converted into a surplus credit of $111,255 at year-end. Company's net worth increased from $3,311,895 to $5,004,900 in the process.

The company also presents a clean balance sheet. Notes payable aggregating $1,060,000 were retired during 1948, leaving no indebtedness other than trade accounts. Working capital as of Dec. 31 came to $2,687,607 with available cash of $2,320,141 to meet total current liabilities of $1,402,301.

▶ **Depreciation**—Flight equipment and other properties are carried at a depreciated valuation of $1,883,640, as contrasted to an original cost of $5,159,916. Aircraft comprise 12 DC-3s and five DC-4s. The DC-3s are fully depreciated to a residual value of $3000 each and the DC-4s are expected to be fully depreciated to a residual value of $30,000 each by June 30, 1950. In view of higher going prices for this equipment, hidden asset values are present in this account.

Further, depreciation charges should be materially lower for current year and 1950. This will serve to increase any earnings available during these periods as well as make for higher tax imposts. The management displays a courageous attitude toward new equipment which should redound to the long range benefit of the company.

▶ **Won't Buy Planes**—C&S does not propose to purchase new aircraft at this time. Reasons are that until the "new types of aircraft are thoroughly shaken down, operating costs will continue to be high, and the initial cost imposes heavy amortization, interest and insurance charges.

"Also, company believes that with the present available traffic, greater capacity of the new types will result in less frequent schedules. This policy is a radical departure from past practices in the industry when new equipment was bought for competitive reasons at the slightest provocation.

A system of cost control instituted by C&S also appears to have been effective. Total operating expenses were up only 8.6 percent for 1948 over the previous year in the face of a gain of 38 percent in gasoline prices and corresponding boosts for other materials and services necessary in operation.

▶ **Voting Trust**—Book value or stockholders' equity shows a gain of 51 percent, from $6.60 to $9.83 per share, at the 1948 year-end. Nevertheless, a significant omission is made in the C&S 1948 annual report. Company shows capital stock consisting of 509,326 shares as outstanding. No reference is made to existence of voting trust certificates which govern the bulk of these shares.

Actual shares and voting trust certificates are treated as two separate securities in all market transactions and are not interchangeable for delivery purposes. Voting trust arrangement is frowned upon and is suspect in present day corporate practice. Utilization of this device in any capital structure does not instill investor confidence and places a serious handicap in any contemplated future financing.

▶ **UAL Deficit**—While finishing 1948 in the red, the management of United Air Lines expresses considerable cheer in the annual report. A deficit first placed above $4 million in the preliminary 1948 reports is recast to a net loss of only $1,070,358, largely as a result of CAB action on mail rates.

With award of $2,902,000 in retroactive mail pay and provision to absorb costs of the DC-6 grounding, a far better outlook is seen by management throughout the entire United 1948 account. Last year's results compare with an adjusted net loss of $3,474,366 for 1947.

United allocated the $2 million, awarded by the Board as reimbursement of the DC-6 grounding, to 1948 and 1947 income accounts rather than crediting directly to surplus. There is a good basis for this treatment as these costs are to be reimbursable on a monthly basis, starting January, 1949, and can be directly attributable to specific years.

Accordingly, $1.5 million allocated to 1948 was a major factor in reducing the loss for that year, although actual cash will be received on a monthly basis during the next five years.

▶ **Cash Build-Up**—United accumulated cash during 1948 through heavy depreciation charges, amounting to $10,458,095. This compares to $7,902,043 for 1947.

As of Dec. 31, 1948, United showed net working capital of $12,295,481, an improvement over the $7,587,046 revealed a year earlier. Company had commitments for the purchase of Stratocruisers, and construction of facilities, aggregating $12.2 million as of year-end. While depreciation charges may generate cash during the year, it would appear that, in the absence of additional funds, working capital may be reduced to abnormal low levels as contractual obligations are discharged. Moreover, during 1948 the company was called upon to retire $5,840,000 of its long term debt in regular installments. In addition to such current maturities, term-bank loans and debentures amounted to $32,640,000 as of Dec. 31, 1948.

▶ **Book Value**—Giving effect to the various accounting adjustments, United's book value per share on the 2,032,897 shares of common and 36,650 shares of management stock amounted to $17.30 as of the year-end.

While the separate airlines show substantial progress in their individual reports, only when all carriers have issued final accountings for 1948 will it be possible to make comparisons showing relative improvements in significant phases among the industry as a whole.

—Selig Altschul

Stock Transactions

Recent stock transactions, as reported to the Securities and Exchange Commission, include:

● Of the four new directors recently elected to the board of directors of Curtiss-Wright Corp., only one, H. S. Sturgis, reported any ownership of the company's shares. He showed ownership of 1000 shares of common.

● Upon being elected a director of Electric Boat Co., submarine and aircraft builders, E. S. Land, president of the Air Transport Assn., showed the ownership of one share of common stock.

AIR TRANSPORT

Airlines Dissect Equipment 'Bugs'

ATA maintenance meeting focuses microscope on problems arising with aircraft and their installations.

By Robert McLarren

KANSAS CITY, Mo.—Rising materiel costs are rapidly expanding the importance of engineering, maintenance and overhaul charges as major economic factors in airline operation, it was revealed here at the 1949 Air Transport Assn. annual Airline Engineering and Maintenance Conference.

New, high-performance transport aircraft are certain to accelerate this trend.

▶ **Record Attendance**—The new importance of ground service was seen in the conference roster of 462 representatives of 34 scheduled airlines, the largest attendance ever recorded for the meetings. An equally vital index to this new significance was seen in the high caliber and large representation of airframe, powerplant and equipment manufacturers, which placed heavy emphasis on technical rather than sales personnel, as in the past.

The conference agenda consisted of some 300 questions divided into nine subjects, each comprising an all-day discussion. Generally, the sessions indicated that the manufacturer is doing a much more cooperative and effective job in modifying and developing his equipment to meet airline objections. At the same time, however, there were indications that the manufacturer is relying excessively on the requirements of the original specification; and it is in the determination of these requirements that the ultimate maintainability of the equipment is often determined.

▶ **Unification of Standards**—The 1949 conference proposed the first step towards a unification of maintenance design standards by the airlines through the proposal that a system be established whereby the airlines in concert could apprise a manufacturer of their desired maintenance features in a new product. A comprehensive plan has been proposed and sanctioned by the Air Transport Assn. for presentation to the airlines and the industry for comment.

Discussion of electrical systems, led by R. M. Dunn, TWA, indicated that new aircraft are depending increasingly on electric operation of equipment, with the Boeing Stratocruiser closely approaching the impending "all-electric" aircraft design. The tremendous electrical capacity (50,400 watts on the Stratocruiser) now available in aircraft requires more and more protective devices which, through their complexity, increase maintenance problems.

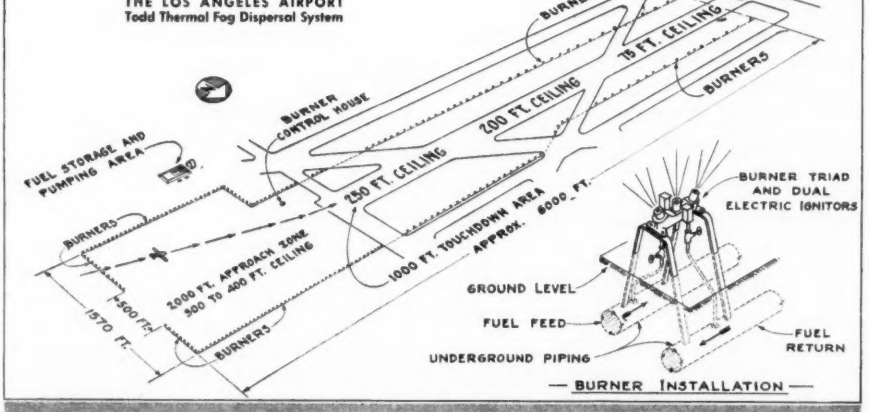
▶ **Overvoltage Protection**—While it has heretofore not been customary to provide overvoltage protection on aircraft, it is becoming evident that protection of equipment is as vital as protection of wiring in aircraft electrical systems. Airframe manufacturers have provided only wire protection, assuming that the equipment manufacturers would provide their own protection. This has not always proved the case resulting, at times, in extensive equipment damage. Both groups indicated their willingness to cooperate on this subject in the future.

The airlines were sharply critical of wiring installation on new aircraft and complained of poor lug staking and soldering of connections in the factory. The airframe representatives believe this is a problem of workman education in the greater skills required in recent installations.

▶ **Abrasion Problem**—Heat-resistant wire designed for powerplant installation has proved subject to abrasion, but a new nylon-covered wire is now under development which is expected to provide excellent abrasion resistance. The wire is covered with an extruded nylon that is virtually flame-proof and has passed severe abrasion tests. Most airlines believe that abrasion resistance is more important than heat resistance, and many use ordinary wire (cotton-covered and placed in conduit in the engine compartment) for this reason.

Fire detection equipment has vastly improved, and many airlines report no case of false warning on Edison units in the past year, although other units continue to give some trouble. Microswitches continue to be susceptible to moisture. The airlines are divided on the application of Dow-Corning compound as a sealant to prevent the entry of moisture and the drilling of a hole in the case to permit drainage of moisture should it collect.

Carriers are obtaining 15-22-mo. service from aircraft batteries. One of the innovations in battery maintenance and repair is the practice of Trans-



LOS ANGELES FIDO INSTALLATION

Sketches show in two dimensions operation of the oil-burning fog dispersal FIDO system completed at Los Angeles Municipal Airport. Top view shows runway with 392 pressure atomizing variable capacity burner triads spaced at 10 to 90 ft. intervals along both sides of the runway and approach for 6000 ft. Operator in control house can vary fuel burned to meet various fog densities. Lower view shows cross section of runway during fog landing. Ceiling has been raised by heat of the burners, from 300 to 400 ft. in approach, 200 to 250 ft. in touchdown area, and 75 ft. in landing area. Insert shows details of the triple burner and its underground fuel feed pipes.

Canada Air Lines, which rebuilds its own batteries. Although cost data have not yet been compiled, TCA employs only two men full-time in this work, servicing batteries for the carrier's entire fleet.

► **Instrument Sessions**—T. W. Gibson, Braniff Airways, conducted the instrument sessions, which developed the substantial shift from mechanical to electrical operation in the past year. This has required an extensive education program, not only of ground personnel, but of pilots and flight crews, who have only gradually learned to trust the readings of the new electronic instruments.

► **Hydraulic Systems**—The hydraulic and vacuum system sessions, chairmanned by J. Weesner, Pan American Airways, indicated a growing trend towards reduction of these installations. Trend has already reached its zenith in the Stratocruiser, which has no vacuum system. Hydraulic systems are gradually being replaced by electric units and may disappear in the future, except for some small, highly-specialized systems.

Complaints of poor manufacture were also voiced in this session, centering about inferior methods of forming hydraulic tubing as evidenced by poor flares, split tubing, etc. Hydraulic maintenance problems are diminishing due to the replacement of 24ST tubing with stainless steel, Everdure and other more rugged and heat-resistant materials.

► **Nonflammable Hydraulic Fluids**—Airlines have not yet accepted nonflammable hydraulic fluids, although tests are being run on some types now available. Carriers are interested in the so-called "interim fluid," which requires no changes in hydraulic packing, but none has yet been tested that is completely satisfactory. Those in the session believed the "ultimate fluid" is still some years off and, since this fluid will require complete changes in packings throughout the system, few are anxious to see it arrive too soon due to the costs involved.

Fuel and oil system difficulties still center around integral tank installations, according to the session directed by R. B. Ault, Eastern Air Lines. Carrier representatives agreed that a good basic installation at the factory would go far to minimize service difficulties, but this had not been obtained to date. Tank sealing material still requires frequent replacement and constant inspection.

Plastic fuel cells are not yet wholly satisfactory either, the difficulty centering in improper curing of the resin at the factory. Northwest Airlines solved this difficulty by the creation of suitable inspection methods and techniques in their receiving department, but it believes that workmanship at the factory on the Martin Mareng cell needs improvement through education.

► **Structures and Controls**—The session on structures, controls and furnishings led by L. T. Long, United Air Lines, indicated that careless ground crew workmen can cause more structural damage to aircraft than can flight loads. Cracked skins on DC-6 wings and tails have been caused by mechanics walking on them rather than by in-flight structural failures.

One of the major structural problems on both the DC-6 and Constellation is the pressurized windows, which develop "crazing" under the stress of internal pressure and have to be replaced for structural reasons.

Another problem is that of the freezing of water systems at high altitudes. This apparently cannot be solved without extensive redesign of the water and heating systems of the aircraft involved. Concentrated floor loads continue to present support difficulties, and satisfactory tie-down facilities are not yet available.

► **Heating and Pressurization**—A. M. Sutherland, Trans-Canada Airlines, directed the discussion on heating, ventilating and pressurization equipment, which indicated that many problems remain to be solved in these systems. The Janitrol heater is used almost exclusively by the airlines and has proved satisfactory on the whole. But it continues to develop cracks and to exhibit ignition difficulties, particularly at high altitude where the "blow out" problem, akin to that familiar in turbo jet engines, is experienced.

Wing ram air inlets present icing problems, which reduce the flow of air to heating and pressurization units, creating dangerous conditions that are met only by shutting down the units. Non-ram inlets, such as are used on the Constellation and the Stratocruiser, do not suffer from this difficulty, indicating the problem is one for the airframe manufacturer in the initial layout of the airplane.

► **Pressure Fluctuates**—A phenomenon of the pressure cabin is a takeoff "bump", in which the pressure suddenly fluctuates in the cabin, and altitude "hunting", in which the pressure oscillates. These are problems of the automatic cabin pressure control system, which only experience will solve.

Airlines are still divided on the proper distribution of cabin heating, some using overhead ducts that distribute the heat through anemostats and others using cabin floor outlets with individual controls under each cabin seat. A phenomenon of the pressure cabin is cabin "rain", caused by moisture condensation on the cabin skin in contact with the cold outside air. This is usually frozen at high altitude but as soon as the airplane nears the ground this ice melts and literally rains on the passengers and, particularly, the flight crew, which often carries towels expressly for this purpose.

► **Engine Discussion**—R. E. Geror, Northwest Airlines, headed the discussion of Pratt & Whitney engines and R. A. Miller, American Airlines, the session on Wright engines. These sessions indicated that ground operation of engines has a far more pronounced effect on engine life than its long hours of cruising in the air. This ground handling varies widely between airlines.

For example, some break the "hydraulic lock" on their engines by simply pulling them through by hand, others by inching them through with the starter, others by starting them up and still others use a new Jack & Heintz unit that handles engine hydraulicing by a special motor. In any case, the session indicated that closer attention to engine starting, warmup and idling techniques would pay big dividends in engine life for all airlines.

Ralph Geror placed great stress on the huge cost of a new powerplant ($97,000 for each one on the Stratocruiser) and the great losses that can be suffered by an airline by undue restrictions on the maintenance of such units.

► **New Overhaul Problem**—With the huge Pratt & Whitney R-4360 Wasp Major now coming into service, operators are divided on the most economical method of their overhaul. Since the installation of overhaul equipment is a huge financial undertaking, PAA has decided to contract part of its Wasp Major overhaul with Pacific Airmotive Corp., while Northwest will overhaul its own engines.

Otto E. Kirchner, American, directed the discussion of ground servicing equipment that illustrated the mounting costs in this field due to individual airlines' apparent refusal to consolidate their requirements. Operators are paying much greater attention to the ground servicing equipment already in use, both in greater maintenance and in painting and improving its appearance.

► **Training Programs**—In addition, some carriers are instituting training programs in ground equipment operation and are making frequent field service visits in an attempt to consolidate requirements. They are solving the problem of ground equipment costs by two methods: (1) using each other's equipment, and (2) subscribing to terminal corporations. The latter, however, apparently do not pay the highly personalized attention to individual airline passengers and crews that is desirable.

R. M. Dunn, TWA's director of maintenance and engineering, was elected general conference chairman for the 1950 ATA meeting and Kansas City was selected again as the site for the meeting.

CAB Head Warns on Subsidies

O'Connell concerned about airline reliance on mail pay; suggests revision in law may be called for.

The scheduled air transport industry, apparently headed for its first profitable postwar year, has received another blunt warning that it must not look to government mail pay subsidies for permanent prosperity.

Latest admonition came from CAB Chairman Joseph J. O'Connell, Jr., less than a month after the Board issued orders providing for multi-million dollar retroactive mail payments which wiped out the domestic trunklines' operating deficit for 1948 (AVIATION WEEK, Mar. 7). O'Connell told the industry that if present mail pay subsidy provisions of the Civil Aeronautics Act serve to dull the operators' initiative and incentive the law may have to be revised to lower or remove the shield which now protects the companies from the danger of bankruptcy.

▶ **Profits Seen in 1949**—The CAB chairman's statement before the New York Bar Assn. was highlighted by a prediction that the industry will end this year in a "much stronger position than at any time since the end of the war." His view coincided with an assertion by Air Transport Assn. Vice President Milton W. Arnold that "the airlines as a group should make money in 1949 according to the best indications so far this year."

During 1949, O'Connell declared, mail pay for domestic trunklines, feeders and U.S. international flag lines may reach $125 million. This compares with close to $100 million in 1948.

▶ **Not All Subsidy**—The chairman emphasized that much of the total is not subsidy but compensation for services performed. He said that "in terms of its potential contribution to the U.S. economy, postal service and defense, a well-designed and properly functioning air transportation system would be worth many times the present level of mail pay." The $100 million in mail pay last year was only about half the cost of supporting the price of potatoes, O'Connell noted.

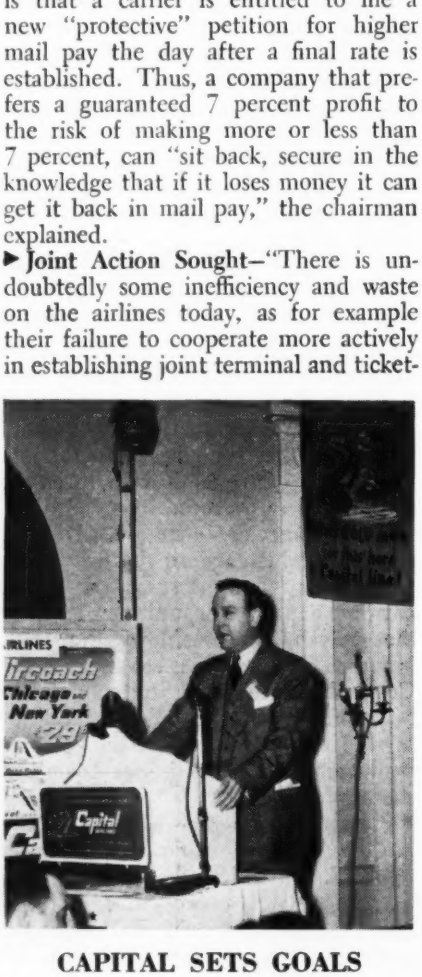
Nevertheless, he manifested deep concern that the mail pay device may be working against development of a sound transportation system of the type and size desired. The chairman expressed hope that airline management would make decisions and behave as "business men." He cautioned the industry to take with "a ration of salt" statements (made repeatedly by one executive) that the government is making money off the down-trodden airlines.

▶ **Cost-Plus Danger**—O'Connell said that during part of 1948, nearly all of the domestic trunklines, feeders and international carriers had applications pending before CAB for increased mail rates. This meant that from the date of each carrier's petition for higher mail pay until the Board set a final rate, the companies were in a position to collect from the government all costs (less disallowances) plus a fair return on their investment (usually 7 percent).

The rub, according to O'Connell, is that a carrier is entitled to file a new "protective" petition for higher mail pay the day after a final rate is established. Thus, a company that prefers a guaranteed 7 percent profit to the risk of making more or less than 7 percent, can "sit back, secure in the knowledge that if it loses money it can get it back in mail pay," the chairman explained.

▶ **Joint Action Sought**—"There is undoubtedly some inefficiency and waste on the airlines today, as for example their failure to cooperate more actively in establishing joint terminal and ticketing facilities. But I doubt if it can be demonstrated that the carriers are really inefficient in the orthodox meaning of the term."

With a fixed 7 percent profit guarantee, the carriers may not be inclined to keep strict control of their seat capacity, rates, fares and debt structure, and have no incentive to ask that uneconomical routes or stops be eliminated, O'Connell pointed out. "If we do not explore ways in which proper incentives for economy may be provided, our air mail bill can be expected to continue to rise, and we may seriously and permanently undermine the economic soundness of our air transportation system because of the atrophy of airline management's ability to behave like businessmen."



CAPITAL SETS GOALS

James W. Austin, Capital Airlines' vice president-traffic and sales, has announced his company is shooting for $20 million in nonmail revenue during 1949, nearly 10 percent above the $18,338,000 figure reported for 1948. An industry leader in charter sales, Capital hopes to do $1 million worth of business in this field alone. Austin, an enthusiastic backer of Capital's skycoach experiment, is shown above speaking at a company management and sales conference held recently at Virginia Beach, Va.

NAL Shows Steady Earning Increase

Continued frigid relations between National Airlines and the Air Line Pilots Assn. have failed to put a chill on NAL's wintertime profits.

With the help of mail pay increases, National has shown steadily increasing earnings following settlement of the 10-month-long ALPA strike last November. Carrier's profit climbed from $60,685 in December to $152,252 in January and $301,628 in February. For the eight months ended Feb. 28, 1949, National had a net loss of $372,894, compared with a $1,416,672 deficit for the comparable eight months ended Feb. 28, 1948.

▶ **Traffic Gains**—Passenger load factors also reached a post-strike peak in February of this year, hitting 55.7 percent against about 40 percent registered during last November.

But the Air Line Pilots Assn. insists that National's earning power is still impaired by management policies. ALPA pilots have filed a long list of grievances against the company since the strike, and the union's members have not yet taken their place in NAL cockpits (AVIATION WEEK, Mar. 7).

▶ **Double Payroll Criticized**—ALPA President David L. Behncke states that National had 287 pilots last month, compared with 125 at the beginning of the strike on Feb. 3, 1948. No significant expansion of operations or increase in equipment justifies this addition of 162 pilots, according to ALPA President Behncke.

Majority of the 287 pilots apparently are non-ALPA personnel hired during the strike. While they are flying NAL's planes, the ALPA pilots are receiving base pay from the company under the strike settlement agreement. Behncke has called on CAB to investigate the costs involved to the airline in the double payroll.

Georgia Line Plans To Use Bonanzas

Another lightplane airline has issued an indirect challenge to conventional feeder operations which are under fire because of high subsidy requirements and low payloads.

Less than two months after Val-Air Lines, Mercedes, Tex., and Carco Air Service, Albuquerque, N. Mex., applied for CAB certificates to carry interstate traffic in small single-engine aircraft (AVIATION WEEK, Feb. 14), Albany Airways, Albany, Ga., requested authority to fly passengers, cargo and mail between 15 cities in Georgia, Alabama and Florida. The Georgia carrier plans to use four-place Beech Bonanzas as standard equipment.

▶ **Equipment Geared to Traffic**—W. L. Hall, Albany Airways president, asserts that Bonanzas are "the most efficient and adequate equipment for the present level of air transportation needs in the area." He states that after traffic expands his company will switch from lightplanes to larger aircraft.

Albany Air Service, an affiliate of Albany Airways, has been operating lightplanes on regularly scheduled intrastate service between Atlanta and Albany for about two years. Between May 14 and Dec. 31, 1948, Albany Air Service made 602 flights on its 150-mile link, carrying 773 passengers and achieving a 42.8 percent load factor.

▶ **Feeder Route Paralleled**—Albany Airways wants a certificate to operate between Savannah, Ga., and Montgomery, Ala., via six intermediate points and between Jacksonville, Fla., and Atlanta via six intermediate points. The latter route substantially parallels a link certificated to Southern Airways, a feeder which has experienced considerable difficulty starting service but which hopes to get underway this spring.

Meanwhile, strong opposition has developed to Val-Air Lines' request for a certificate or exemption authorizing carriage of interstate traffic on its intrastate route from the Rio Grande Valley to San Antonio and Houston. Trans-Texas Airways, a certificated feederline operating DC-3s in the South Texas area, contends that Val-Air's four-place Navions offer destructive competition because of their more direct routing.

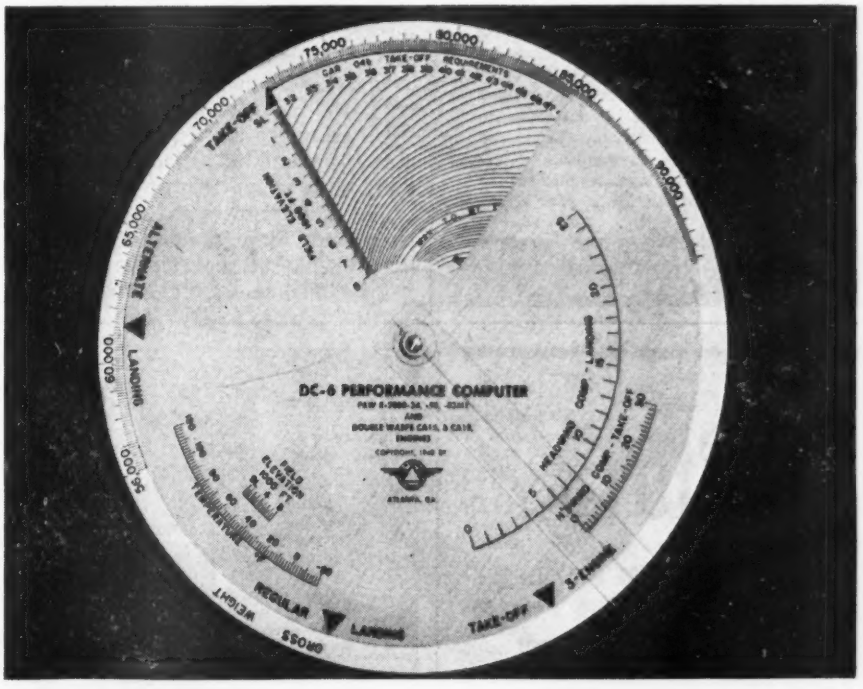
▶ **Lightplane Operations Challenged**—TTA also charged that Val-Air's operation "is not in keeping with the high standards of CAA and CAB regulations covering carriage of interstate passengers." Lightplanes cannot meet the stringent requirements of the Civil Air Regulations' transport category.

But the lightplane lines point to the potentially large savings in mail pay subsidies that could be achieved if they were authorized to operate over low-traffic routes. In 1948, conventional feederlines, most of which used DC-3s, had total operating costs averaging around 80 cents a plane mile and needed about 60 cents a plane mile mail pay to break even.

▶ **Cost Figures Disputed**—In contrast, Val-Air Lines Attorney Harry Bowen claims his company can operate at a total cost of about 15 cents a plane mile. Beech Aircraft Corp. estimates that its four-place Bonanzas can be operated at about seven cents a plane mile, including costs of fuel, pilots (at $400 a month), depreciation, maintenance and insurance—based on 1200 hr. a year utilization of the planes.

Eastern Air Lines, which opposes Val-Air's application, pointed out that the Texas company lost $80,363 during 21 months of service between April, 1947, and December, 1948. This deficit, EAL declared, was equal to $14 for each of the 5475 passengers carried by Val-Air during the period. (Mail pay per feeder passenger carried in 1948 averaged around $25.)

Other critics of lightplane airline operations argue that no night or instrument flights would be feasible and that many passengers accepting twin-engine feeder equipment might be hesitant about using single-engine craft even during daytime. They assert that Val-Air's figure of 15 cents a plane mile total operating costs does not give realistic consideration to traffic, sales, advertising, general and administrative expense.



Delta Develops Data Computer

Delta Air Lines has developed a handy computer for quickly determining information necessary for DC-6 takeoffs and landings. As far as known, this is the first such computer ever developed and will effect a substantial saving by reducing chances of error and amount of paper and calculating work necessary to be accomplished by station personnel.

Developed by John F. Nycum, chief engineer, and Robert Dutton of the engineering department, computer is used with a pre-engineered one-page table. Table contains all constant factors pertaining to performance on a given runway, mechanically determines allowable takeoff gross weight; allowable alternate landing gross weight; three-engine takeoff gross weight; and headwind component, based on effective field lengths, winds, and outside air temperatures.

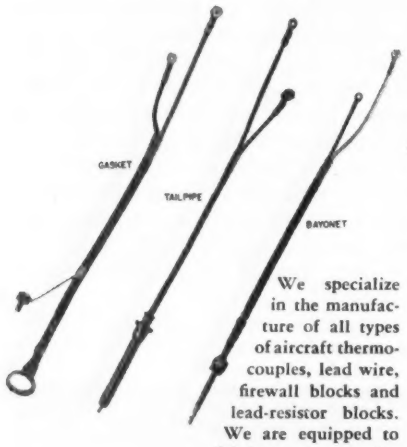
▶ **Quantity Production**—Prototype of this computer was developed and used in Delta's Atlanta, Ga., operations office for DC-4 aircraft. It proved a time-saver and results were so satisfactory that development was undertaken for one for the DC-6.

The DC-6 computers are now in production in sufficient quantity to furnish all Delta DC-6 stations and pilots. This type covers most engine-propeller combinations now in service that are not utilizing water injection. Wet engine performance is applicable to this method of solution, however, and will

LEWIS

THERMOCOUPLES

FOR ENGINE TEMPERATURES



We specialize in the manufacture of all types of aircraft thermocouples, lead wire, firewall blocks and lead-resistor blocks. We are equipped to fabricate jet engine thermocouple-harness assemblies, connecting-lead assemblies and special connector blocks to your specifications. Bring your temperature measuring problem to us, whether it is a new thermocouple, harness, or connecting lead, we are at your service.

THE LEWIS ENGINEERING CO.
CHURCH ST. • • • • NAUGATUCK, CONN.

be incorporated in this design if a demand exists.

Delta has been approached to make the computer available to other airlines and prospects are that it will be done. Basic principle of the computer is applicable to other type of aircraft, so that a computer can be made for any specific type.

Insurance Reacts To Safety Record

Steadily improving safety record of the certificated airlines is being given favorable recognition by the nation's insurance companies.

A new report by the Institute of Life Insurance has disclosed that passenger travel on U. S. scheduled domestic airlines is no longer a significant underwriting factor in the issuance of life insurance policies. Of 100 companies surveyed by the Institute, 95 now accept at standard rates applicants patronizing the scheduled domestic airlines.

▶ **Twelve Firms Impose Limitations**—Eighty-three of these 95 companies accept the domestic airline users without limitations other than those applying to all applicants. Twelve companies have some limitations, the most frequent being an expected maximum of 250 hr. of domestic flying annually.

Remaining five companies give individual consideration to insurance policy applicants using the certificated domestic airlines. This does not necessarily mean that these firms are any less liberal than the other 95 but rather that no fixed rule has been established by these particular firms.

▶ **Contrast With 1935**—Current insurance company practices regarding air travelers are in sharp contrast with the situation a decade or so ago. As recently as 1935, only six companies accepted passengers on scheduled U. S. airlines at standard rates without limitation; and while 46 firms accepted them as standard with restrictions, the most frequent limitation was then 50 hr. of flying annually. In 1935, ten companies either declined to issue insurance to domestic air travelers or issued them policies excluding the air risk if there was an unusual amount of flying involved by the person.

Flights outside continental U. S. have not followed this same pattern of liberalization. But while there has been a tightening of underwriting on both Western Hemisphere and worldwide flights since 1946, practices are still considerably more liberal than prior to 1946.

Seventy-three out of the 100 companies surveyed accept at standard rates insurance applicants traveling by scheduled airline in the Western Hemisphere. Of these, ten impose some limitations. Twenty-four companies leave the matter to individual consideration. Three firms decline policies for applicants flying outside the U. S. in the Western Hemisphere, or write the policies with the air risk excluded.

▶ **World-Wide Travel**—With reference to worldwide flights via scheduled airliner, 53 insurance companies accept applicants at standard rates; and of these, 10 impose some limitations. Forty-three companies leave the matter to individual consideration; and four firms refuse policies to applicants making world-wide flights, or write policies with the air risk excluded.

Significantly, in 1935, none of the 100 insurance companies surveyed accepted at standard rates without limitation persons flying either in the Western Hemisphere (outside the U. S.) or on worldwide trips. And 21 companies, in the case of Western Hemisphere flights, and 28 firms, in the case of worldwide flights, declined policies completely or wrote them with the air risk excluded in 1935.

Passenger travel on nonscheduled commercial flights, including taxi and charter trips, is currently underwritten by the life insurance companies on a more liberal basis than a few years ago, but restrictions are still considerably more common than is the case with the scheduled airlines.

count on

Clary for

AIRCRAFT CONTROL BEARINGS, ROD-END BEARINGS AND PULLEYS

Large stocks lubricated to current AN specifications.

HARDWARE

Bolts, Cable, Clamps, Cotter Keys, Fittings, Gang Channel, Nuts, Nuts, Self-locking, Pins, Clevis, Pins, Taper, Rod Ends, Screws, Turnbuckles, Valves, Washers

RELUBRICATION SERVICE

Bearing and Pulley Relubrication to Current AN (AN-G-25) or Commercial Specifications.

REPRESENTING

The Lamson & Sessions Co., Cleveland, Ohio
Bolts, Nuts, Screws (Aircraft Quality)
George K. Garrett Co., Inc., Philadelphia, Penn.
AN Washers and Lock Washers
The Atco Pulley Co., Pennsylvania
Aircraft Control Pulleys

Clary MULTIPLIER CORPORATION
AIRCRAFT HARDWARE DIVISION
425 E. 54th Street Los Angeles 11, Calif.
Telephone CEntury 2-9221

FLAT RATES for INSTRUMENTS & PROPS

Flat rates on labor to overhaul instruments and props for D18S, Lodestar, DC-3, Mallard, Bonanza, Navion and others. Take advantage of new, sensational rates in SAC's FLAT RATES CATALOG!

Check the FLAT RATE CATALOG today!

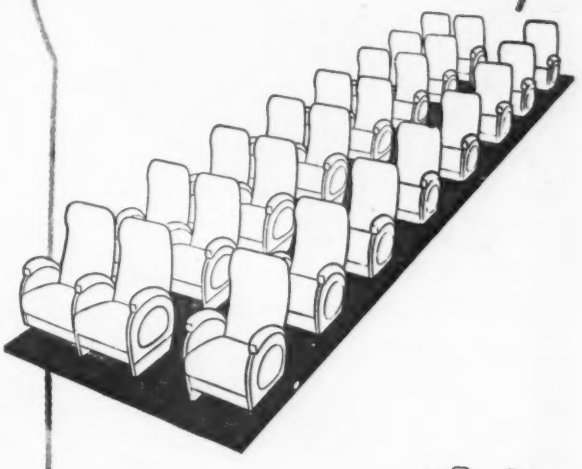
"The Flat Rate Company"

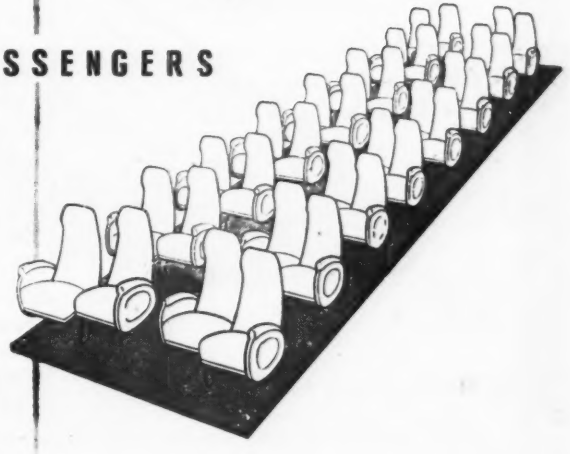
Southwest Airmotive Co.

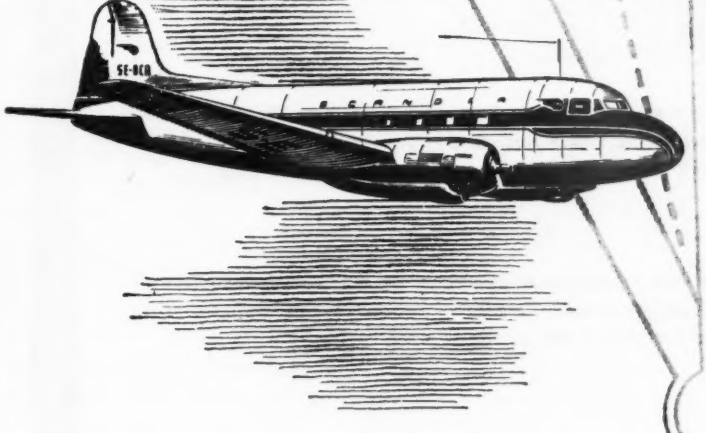
CAA Approved Repair Station No. 195
Love Field, Dallas

TIME IS MONEY...

WITHIN
30
MINUTES
FROM
24
TO
32 PASSENGERS





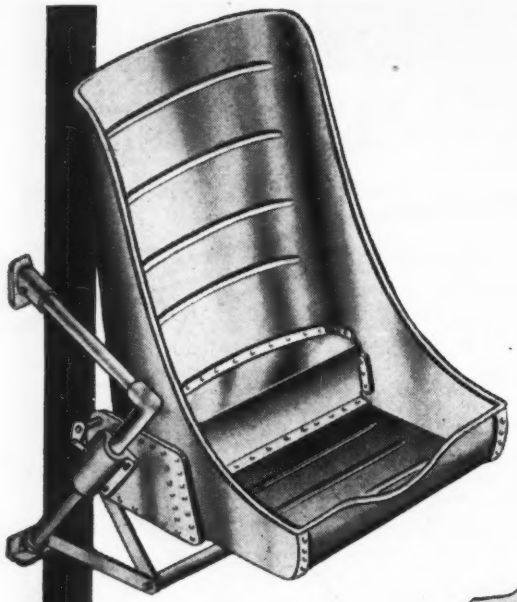


On long-distance routes the Scandia normally accomodates 24 passengers but by changing the armchairs from one type to another, the accommodation can be converted to 32 seats in less than half-an-hour. This possibility allows the Scandia to be operated economically and with a minimum time loss in every special case.

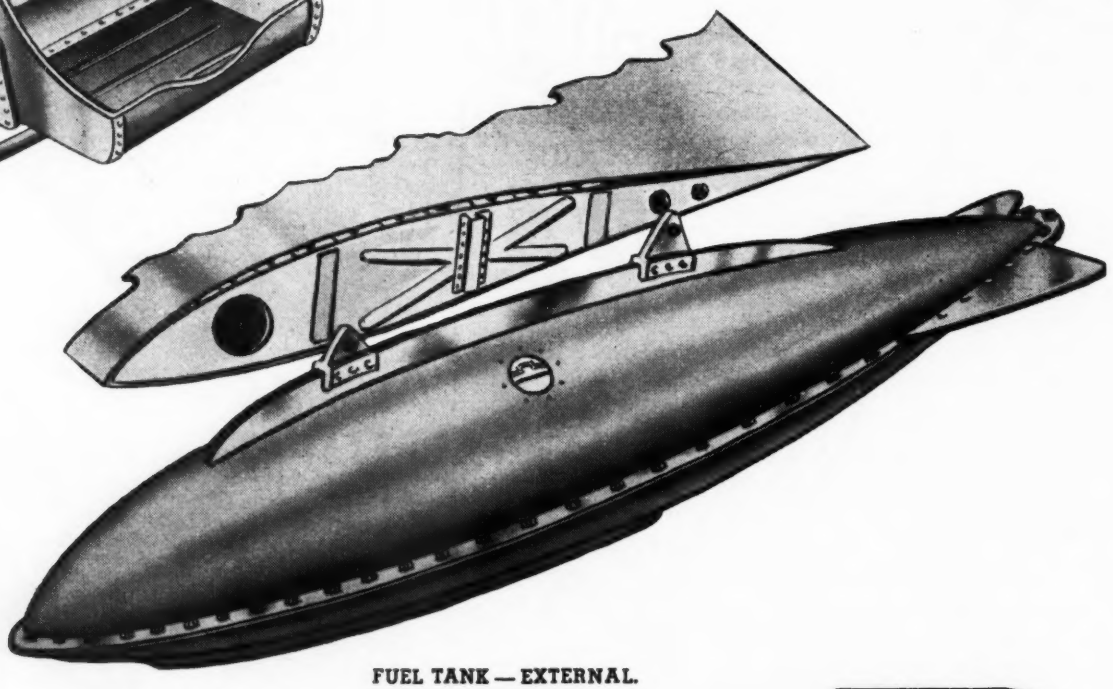
Scandia

SVENSKA AEROPLAN AKTIEBOLAGET · SAAB AIRCRAFT COMPANY · SWEDEN

In Production for Trainers and Bombers



40-G PILOT'S SEAT—SHORT RANGE AIRCRAFT. Adjustable 7" vertically and 3" forward. Designed specifically for use in trainer aircraft. Now being manufactured in quantity for North American Aviation's T-28 trainer.



FUEL TANK — EXTERNAL. Completely tooled and now being manufactured in our plant for use on North American bomber.

● Pastushin Industries is subcontractor to major aircraft manufacturers and airlines. We are proud to serve Boeing Airplane Co., Consolidated-Vultee Aircraft Co., Douglas Aircraft Co., North American Aviation, Northrop Aircraft Co., Ryan Aeronautical Co., and leading airlines in the United States and abroad.

In addition to pilot's seats and wing tanks, other products manufactured by Pastushin Industries are aircraft buffets, spinners, cowling, engine mounts, bulkheads, circumferentials, water tanks, special leak-proof jacketed rivets, and extruded, formed components.

VIC PASTUSHIN INDUSTRIES, INC.

Los Angeles Airport

5651 W. Century Blvd. • Los Angeles 45, California

Seeks $21 Million

Northwest Airlines is negotiating for $21 million in loans which will be used primarily to finance its purchase of ten Boeing Stratocruisers. Reconstruction Finance Corp. has been asked to furnish $11 million, and banks would furnish the remainder.

Disclosure coincided with Boeing's announcement that the first of the Stratocruisers to be delivered to NWA had make its initial test flight. Northwest plans to use the $1.5 million planes on its transcontinental, Hawaiian and Orient routes.

SHORTLINES

► **Air Industries, Inc.**—Has asked CAB for a certificate authorizing passenger, cargo and mail operations over helicopter routes in the New York area. Links would extend between La Guardia, Teterboro, Westchester, Newark, Floyd Bennett and Idlewild airports; between the Grand Central Post Office, New York, and the 30th St. Post Office, Philadelphia; from La Guardia and Idlewild to Long Island points; from Newark and Teterboro to New Jersey points; and from Idlewild, La Guardia and Westchester to southern New York State and Connecticut points. President Otto Marx, Jr., states his company would use Sikorsky S-51s or other suitable equipment to conduct the operation.

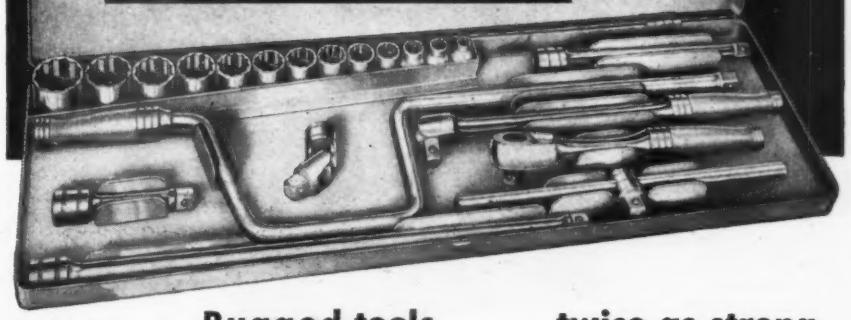
► **American**—Continued to set winter traffic records during February, with revenue passenger mileage up 42.3 percent over February, 1948 (when DC-6s were grounded). Freight was up 35 percent to 1,893,909 ton miles, and mail volume gained 60 percent; but express ton mileage of 369,522 was down 5 percent from levels in February, 1948.

► **KLM**—Will increase its New York-Amsterdam flights to seven weekly on Apr. 4 and to nine weekly flights on May 16.

► **National**—CAB has denied Colonial Airlines' request for postponement of further proceedings in the NAL dismemberment case pending investigation of the possible effect of actual and proposed NAL stock purchased by W. R. Grace & Co. and Pan American Airways, and of interchange agreements involving National, PAA, Panagra and Eastern Air Lines.

► **Northwest**—A Presidential emergency board has settled a dispute between NWA and the International Assn. of

Snap-on's FAMOUS Ferret Set



Rugged tools . . . . twice as strong as you would expect such slim, streamlined handles and thin-walled sockets to be.

"The Choice of Better Mechanics"

Mechanics like this set because it is way over par in performance . . . the tools are strong and easily adaptable to a variety of jobs.

They squeeze into tight places and get those hard-to-reach nuts and bolts that defy the ordinary type wrench. Recently designed by Snap-on engineers, they have the new features that make fast, easy work of the tough jobs.

INCLUDED IN THE SET: 1/4" and 5/16" single broached sockets; 11 double broached sockets from 3/8" to 7/8"; a speeder wrench, sliding tee, 8" reversible ratchet, nut spinner and universal joint, plus a 3", 6" and 12" extension. All complete in a metal box for only **$27.65**

Present Owners — *Supplement your present set with these special Ferret tools . . . . .*

CLUTCH-TYPE SCREW DRIVER
Handles clutch-type (figure 8) head screws. Built short for easy operation in close quarters.

RATCHET ADAPTOR
Converts any combination of Ferret handle, extension and socket into a reverse action ratcheting tool.

PLASTIC GRIP HANDLE
A shockproof, plastic handle, 5⅛" long that is ideal for electric work. Makes your Ferret Set more useful.

DOUBLE HEX FLEXOCKETS
Saves a lot of tough work fumbling for hard to get at studs and bolts. Eight sizes: 5/16" to 3/4".

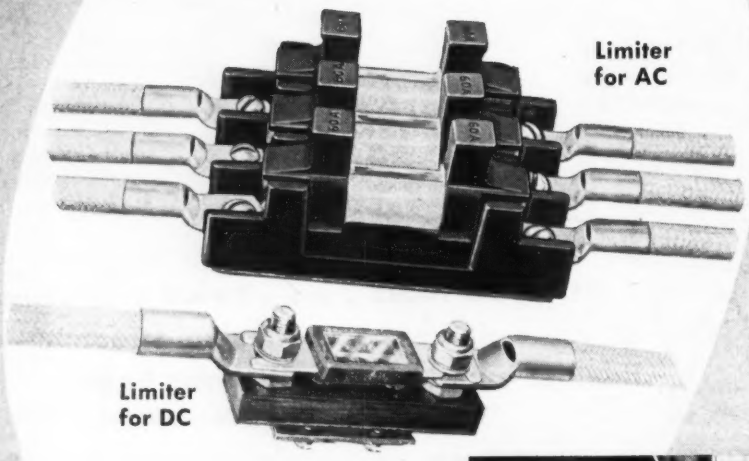
FERRET FLEXTENSION
A flexible steel cable extension connects handle and socket to work around corners and over obstructions.

EXTRA LONG FERRET SPEEDER
36½" long, 27" shank. Radius of sweep is 3¼". "Palm-Grip" handle rotates to provide easy operation.

SNAP-ON TOOLS CORPORATION
8020-D 28th Avenue, Kenosha, Wisconsin
Enclosed find ☐ check ☐ Money Order or
☐ Company Purchase Order for the $27.65 Snap-on Ferret Set.
☐ Please send illustrated brochure describing 109 individual Ferret units.

Name.....
Address.....
City.....State.....

Safeguarding
Aircraft Electrical Systems



BURNDY
Aircraft Limiters

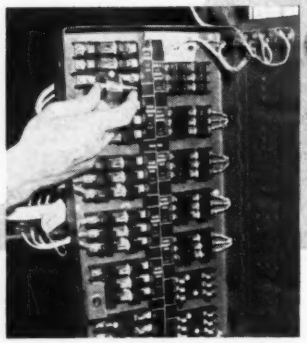


Photo shows how circuit protection is provided for the B-36 with the installation of Burndy Type F1L Limiters.

As a SAFEGUARD to flight, today's modern aircraft electrical system is Burndy-Limiter protected. These vital aircraft "fuses" carry temporary overloads but clear promptly under short circuits. They are particularly recommended for systems which use multiple conductors per phase for, when Limiter protected, a fault on a single wire is cleared without interruption of current in that leg of the circuit.

The close co-ordination of these highly accurate Limiters, unlike other thermal devices is little affected by the variation of ambient temperatures, thus they provide greater protection with the least weight and space.

Limiters and mountings are offered for 30-volt and 120-volt DC; and 120/208-volt, 400 cycle AC systems in various ampere ratings. Burndy Limiters meet the requirements of USAF Spec. Nos. 32552-A; 32506-B.

Complete engineering service is offered. For particulars, write for Bulletin 47F1.

Connect with
BURNDY
New York 54, N. Y.

WESTERN BRANCH: Vernon 11, California • CANADA: Canadian Line Materials, Ltd., Toronto 13

Machinists. Flight mechanics' salaries were increased $17.50 a month for the period July 1, 1948, to Dec. 31, 1948, and another $7.50 a month starting Jan. 1, 1949. Other personnel represented by IAM received retroactive increases of up to 10½ cents an hour.

▶ **Pioneer**—Lost $50,932 during the first two months of 1949, compared to a loss of $58,307 in the same period last year.

▶ **Seaboard & Western**—A CAB enforcement attorney participating in TWA's complaint against the uncertificated carrier's overseas operations has asserted that S&W's letter of registration should be revoked and the company should be ordered to cease and desist from engaging in air transportation. The attorney said Seaboard & Western has intentionally and continually violated the Civil Aeronautics Act. He added that the company's entire operations, including those allegedly conducted under contract, were actually common carrier in nature.

▶ **Southern Airways**—Has named Hugh M. Davis, former chief pilot and assistant operations manager of Robinson Airlines, as operations manager. Southern plans to begin feeder service this spring.

▶ **Southwest Airways**—Has received a $45,000 Navy Dept. contract for overhaul and modification of government aircraft instruments.

▶ **United**—CAB has dismissed UAL's complaints asking suspension of sky-coach tariffs recently placed in effect by Capital Airlines and Northwest Airlines.

▶ **Western**—Effective Apr. 1 began operating all flights on its coastal division with Convair-Liners . . . Company has inaugurated daily nonstop service between the Twin Cities and Denver.

CAB SCHEDULE

Apr. 4—Prehearing conference on transcontinental coach-type service. (Docket 2401 et al)

Apr. 4—Hearing on Board's investigation of directional air freight commodity rates. Postponed from Mar. 28. (Docket 1705 et al)

Apr. 11—Hearing on Board's investigation of through service and interchange requirements at St. Louis and Memphis. (Docket 3426)

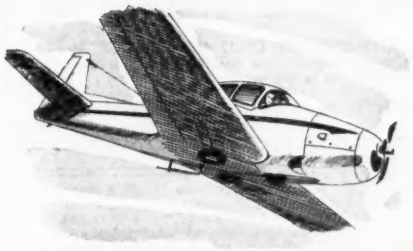
Apr. 20—Hearing on Chicago & Southern Air Lines' application to abandon service at Bloomington, Peoria and Springfield, Ill. (Docket 3571)

May 2—Hearing in reopened Hawaiian case. (Docket 851 et al)

May 2—Hearing on additional southern transcontinental service. (Docket 1102 et al)

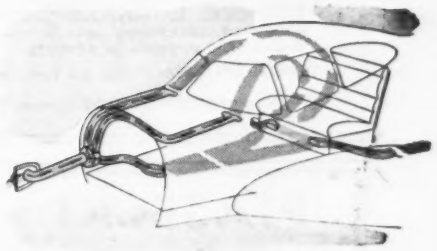
May 16—Hearing on Hughes Tool Co. control of TWA. (Docket 2796)

ONLY THE GREAT NEW NAVION FOR '49 GIVES YOU ALL THESE ADVANCEMENTS

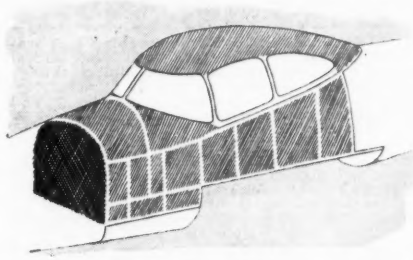


STILL HIGHER PERFORMANCE. New landing gear doors and fairings combine with more powerful 205 h.p. engine to deliver cruising speeds up to 155 m.p.h. Normal take-offs in 560-ft.; only 875-ft. needed to clear a 50-ft. obstacle, both on take-off and landing. New *Navion* climbs 900-ft., 1st minute, fully loaded.

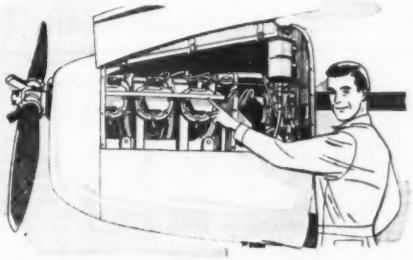
STILL MORE ROOM. Head and leg room to spare for four big people! Rear seat is 6-in. wider, and features new limousine-type folding center arm rest. Seat back tilts forward for easy in-flight access to luggage. With new optional *under seat* auxiliary tank, entire luggage compartment can be used.



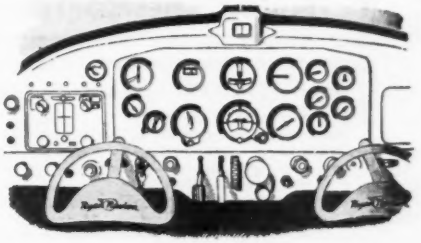
STILL GREATER COMFORT. New ventilating-heating system channels more fresh or warm air to every corner of the cabin. Softer, thicker foam rubber cushions, and high head rest in rear seat... tastefully upholstered in modern fabrics and trimmed with leather at wear points. Front seats adjust to individual requirements.



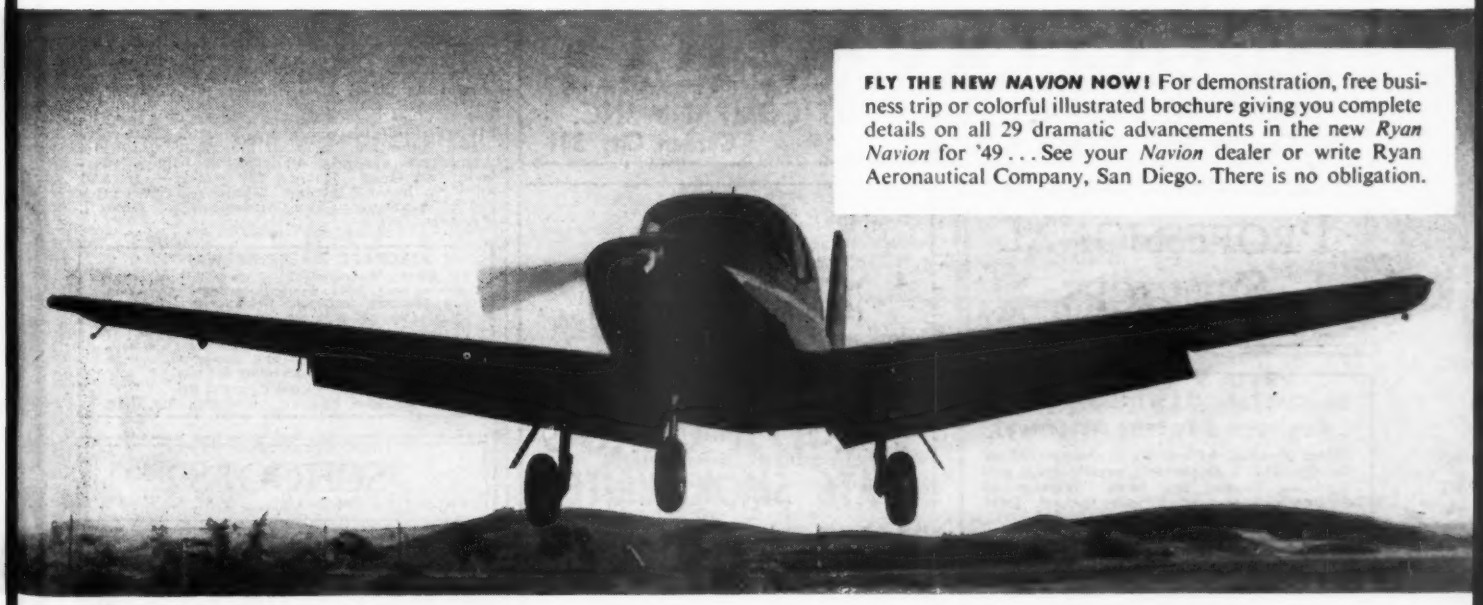
STILL QUIETER. A new, thicker blanket of insulation shuts out noise and heat. Engine exhaust is muffled and discharged under wing. Thicker Plexiglas windshields reduce noise, and new windows filter sunburn rays. Low noise level in *Ryan Navion* for '49 sets a new standard in restful flying comfort.



PROVEN MECHANICAL REFINEMENTS. Exclusive dual fuel system with independently operated engine-driven fuel pump and standby electric pump classes new *Navion* with *most modern* air liners for dependable fuel supply. New VHF radio is now standard equipment. Four new corrosion-proof enamel finishes.



IMPROVED CONTROL AND INSTRUMENT PANELS and more instruments... Manifold pressure, rate-of-climb indicator, outside temperature and dampened fuel gauges now included. Panel lights can be dimmed. Control knobs simulate mechanism they activate for positive identification. New key-ignition.



FLY THE NEW *NAVION* NOW! For demonstration, free business trip or colorful illustrated brochure giving you complete details on all 29 dramatic advancements in the new *Ryan Navion* for '49... See your *Navion* dealer or write Ryan Aeronautical Company, San Diego. There is no obligation.

NO OTHER PLANE COMBINES SO MANY FEATURES SO WELL

Ryan Navion

Rely on Ryan

RYAN AERONAUTICAL COMPANY, 404 LINDBERGH FIELD, SAN DIEGO 12, CALIFORNIA

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • PLANES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE

90¢ a line, minimum 4 lines. To figure advance payment count 5 average words as a line.

INDIVIDUAL EMPLOYMENT WANTED undisplayed advertising rate is one-half of above rate, payable in advance.

PROPOSALS 90¢ a line an insertion.

INFORMATION

BOX NUMBERS in care of any of our New York, Chicago or San Francisco offices count 1 line additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED RATE

The advertising rate is $10.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page.

NEW ADVERTISEMENTS received Friday will appear in the issue mailed the following Friday subject to limitation of space available

A.W.

PIASECKI

Wants---Top Flight Engineers

• For Research, Development, Design & Production of Tandem Rotor Helicopters. Long term program offers exceptional opportunity for ambitious, progressive engineers with training and experience as—

- AIRCRAFT DESIGN ENGINEERS
- MECHANICAL DESIGN ENGINEERS
- STRESS ANALYSTS
- PROJECT ENGINEERS
- VIBRATION ENGINEERS

Write, Giving Age, Experience and Education to

PIASECKI HELICOPTER CORP., Morton, Pa. (Phila. Suburb)

Need A Pilot? Need A Job?

Are you qualified to fly the Atlantic, to instruct, to fly charter, to dust, or to help organize a new airline? We can help you find the job you need, or the man you need. No registration fee.

PILOTS EMPLOYMENT AGENCY
Box 152, Whippany, N. J.

Specialists In Aviation Personnel

An Outstanding agency specializing in personnel procurement for Airline Operators and Aero Mfg. concerns. We invite you to contact us regarding your employment problems.

NEW AGE PERSONNEL AGCY., INC.
55 W. 42nd St. N. Y. 18, N. Y.
(Write of Call BR yant 9-0006

TWIN BEECH

Beech D-18-S: Beautiful ship with complete new soundproof interior just installed, including new reclining chairs, new 3-place couch, new rugs, new curtains, new executive folding table; even new deluxe soundproofed cockpit with interlining and rug to match cabin, new outside trim, new tires. Airframe 1253 hrs, 32 hrs since 1000 hr check; P&W Engines. L 160 since OH, R 230 since OH. New ARC-5 VHF Receiver and Transmitter; Collins 100 watt 3-channel Transmitter; Bendix fan marker; Bendix ADF. New 80 gal. nose tank; Flasher running lights; flares. Have $2,000 in spare parts for plane. Will sell whole works for $34,000.

CARL HOVGARD
292 Madison Ave. New York 17, N. Y.
Phone Murray Hill 9-7200

SEE US FOR APPROVED REPAIR STATION 188

SAE INSTRUMENTS

NEW—USED—ALL TYPES—SALES—REPAIR

STANDARD AIRCRAFT EQUIPMENT COMPANY INC.

Old Country Road, Mineola, L. I., N. Y. Garden City 331

PROFESSIONAL SERVICES

LANCASTER, ALLWINE & ROMMEL
Registered Patent Attorneys

Patent Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Suite 452, 815—15th St., N.W., Washington 5, D.C.

S. B. BARNARD, LL.B., M.E.

Registered Patent Attorney

Mechanical, Electro-mechanical, Automotive and Aircraft Patents.
PATENT ANALYSES and INVESTIGATIONS.
29-28 41st Avenue,
Long Island City 1, N. Y. STillwell 4-5428

FOR SALE

1 C46A
(Late Model) Unlicensed

1 C46D
Unlicensed

2 C-47A CARGO

1 AT6 SMOKEWRITER

1 LODESTAR
14 passenger

Inter American Sales & Services, Inc.
P. O. Box 1125, Coral Gables, Florida
International Airport, Miami, Florida
Telephone: Miami 88-1658

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS WANTED

EXPERIENCED EXECUTIVE Pilot now flying Lockheed for small manufacturer desires similar position where executive and sales ability will build a permanent future. Age 30, married, children. Twelve years diversified flying and airport management experience. Airline Transport rating since 1944 with over 6000 hours in most one, two, and four engine aircraft. Extensive actual instrument experience. Hold mechanic license and have had considerable experience with installation and service of aircraft radio. PW 8484, Aviation Week.

AIRLINE TRANSPORT Pilot seeking corporation, industry, airline position. 6136 honest hours, 4000 multi-engine. Amphibian experience college engineering. Age 31. Travel foreign or domestic. Highest professional and character references. Available April 1. PW 8523, Aviation Week.

OPERATIONS MANAGER; Airline Captain, certified dispatcher with wide experience in scheduled airline operation. Adept in traffic and station management and co-ordinating responsibilities. Also considerable background in production sales. Now employed but seeking employer who will offer reasonable recognition of abilities. PW 8527, Aviation Week.

PRODUCTION ENGINEER — Currently employed in aircraft industry. Design and sales exp. Wants production engineering position. PW 8516, Aviation Week.

FOR SALE

Grumman Widgeon
1030 hours. 115 hours on new engines, new props, new paint. Relicense date of purchase. Very clean. $8,000. FS 8543, Aviation Week.

BUSINESS OPPORTUNITY

For Sale. Finest A&E charter business in New England. Rangeley Seaplane Base, established 1934. 3 airplanes A-1 condition, parts stock,, ramp accommodating 3 amphibians, modern Texeco gas installation, 5-6 months always profitable operation, ideal location, excellent clientele. A & E mechanic available. Attractive grounds, knotty pine office, restroom, on lease. Reason for selling—age and entering hotel business. Valuable opportunity for good young pilots. Address—Bud Russell, Rangeley, Maine.

AIRCRAFT MATERIAL WANTED

All AN Hardware, electrical items & components such as nuts, bolts, bearings, fittings, valves, circuit breakers, switches, lights, relays, pulleys, spark plugs, gas caps, etc.

FOR SALE

One of the largest stocks of aircraft parts and components on West Coast. 100% inspection, courtesy discounts to brokers. Immediate delivery.

COLLINS ENGINEERING CO.
9054 Washington Blvd. Culver City, Calif.

SCHOOLS

Rising Sun SCHOOL OF AERONAUTICS
ESTABLISHED 1930
"Built Upon the Success of Its Graduates"
GOVT. C.A.A. and VETERANS APPROVED
ENROLL NOW FOR NEXT CLASS
Write for Illustrated Catalog
2206-16 E. HUNTINGDON ST., PHILA., PA.

$1,000,000 STOCK OF SERVICEABLE

P&W 1830 Parts

★ certified serviceable ★ inspected ★ magnafluxed ★ warranted

samples of economy prices:

PART NO.	DESCRIPTION	PRICE
115399	Int. Rear Case & Stud Assy.	$150.00
36700	Rod — Master	87.50
74566	Nut — Master Rod	set—
74569	Bolt — Master Rod	2.50
24966	Bearing — Center Main	87.50

Subject to prior sale. Prices subject to change without notice.

Send for COMPLETE LIST of Pratt & Whitney 1830-92 & -90 series PARTS & ACCESSORIES

OPERATORS wishing to purchase the Steward-Davis R-1830-92 Commercial Overhaul at $2295 exchange or the Steward-Davis R-1830-92 Conversion at $1795 exchange should write or wire to WILLIS AIR SERVICE, Teterboro, N.J. — WESTCOAST AIRCRAFT Sales and Service, Boeing Field, Seattle or Customer Service: Steward-Davis.

STEWARD-DAVIS *Parts Division* 13501 S. WESTERN, GARDENA, CALIF.

THE K.C.S. Skyways, Inc.
Announces
The Sale of Their Aircraft and equipment due to an order issued by the Civil Aeronautics Board

4 Douglas DC-3's
1 North American—SNJ-4
Large Stock of DC-3
Spare Parts & Equipment

◆ ◆

All Cockpits and Radio Installations—Standardized

◆ ◆

Fully equipped for De-icing and anti-icing

◆ ◆

All DC-3's have the following Radio equipment installed:

1. Two ADF
2. One ART13—Collins Transmitter
3. One Lear UT 6—Transmitter
4. 274 N Receiver
5. ARN 8 Marker Beacon
6. I.L.S.
7. V.H.F. Receiver and Transmitter, Bendix type selector box and control units installed.

Please quote this ad in reply

THE KANSAS CITY SOUTHERN SKYWAYS, Inc.
114 West 11th St. Kansas City, 6, Mo.

DE HAVILLAND MOSQUITO
MARK 20
100 hours total time on airframe and engines. Always hangared. Ready to go.
PALM SPRINGS AIRPORT CORP.
Box WW Palm Springs, California

FOR SALE

DC-3 21-PASSENGER AIRPLANES

$8,500.00 and up
(plus 2% Sales Tax)

- Equipped with Wright GR-1820-G-102 Engines.
- Recently removed from scheduled passenger service.
- Airframe and engines approaching overhaul.

"AS IS" MUNICIPAL AIRPORT, TULSA, OKLAHOMA

Address all inquiries to:
AMERICAN AIRLINES, INC.
Att: Director of Surplus Sales
43-02 Ditmars Boulevard, Astoria, Long Island, N. Y.
(Telephone RAvenswood 8-1000)

NEW, ORIGINAL FACTORY PACKED SURPLUS AIRCRAFT COMPONENTS
Offered subject to prior sale

760—Engine Mount Sets—Lord Mfg. Co. No. RL15-D-1.
1240—Automatic Gun Chargers — General Electric Type No. 8252911G1.
750—Flap Control Jacks for A-26—Part No. 5191907 -2, -4, -6. (250 of each).
18—Auto Pilots, Minneapolis-Honeywell, Type C-1: Includes vertical gyro, three servo motors, dynamotor, control panel, amplifier, PDI, down lock and directional dampener.

EPCO
1527 E. 7th St. Los Angeles 21, Calif.

BEECHCRAFT D18S
Complete Bendix Airline type radio installation—ARC-VHF transmitter and receiver—De-icer boots—Anti-icing—80 Gallon nose tank—5 Hardman chairs—Folding cabin table — Constant speed propellers — Windshield wipers.
Just relicensed and in excellent condition.

BEECHCRAFT AT-11
5 chairs—Complete radio equipment
All bulletins up-to-date
$12,000

PAGE AIRWAYS, INC.
Rochester Airport Rochester 11, N. Y.

STRICTLY PERSONAL

STRICTLY PERSONAL—The number of letters this writer receives marked "strictly personal" is raising eyebrows in the McGraw-Hill mail room. But it still isn't enough. We need your whimsical contributions quickly, to avoid a big blank space in the page . . . **James Batchelor,** major domo of the United Pilots & Mechanics Assn., thinks this column should issue a call to its readers for true stories about that incredible prankster, **George Haddaway,** boss of Southern Flight Magazine. Who will launch this interesting movement? . . . **Joe Drury,** once with United Press and United Air Lines publicity, has become assistant public relations director of Hearst Magazines . . . **A. W. Dunn,** of Goodyear Tire & Rubber Co. public relations, has been transferred to Goodyear's Aviation Products div., as manager of the Dayton office . . **Bill Sherrill,** Convair's wartime publicity chief in Ft. Worth, is conducting Sherrill-Lloyd public relations agency in Dallas . . . **Scott Hershey,** formerly with ATA's public relations staff, has joined the information division of ECA in Washington.

* * *

TWO STARS ARE MADE—AND FIVE BUCKS—Aviation's glittering entertainment world acquired two stars at Washington's Aero Club's St. Patrick's Day dance. Late in the evening, after a tap dancer's stint, the M.C. announced "two well known singers of Irish ballads." This aroused tumultuous applause from the gay multitude, and the two surprised troubadors finally gave up trying to laugh it off. So **Ansel Talbert,** the N. Y. Herald-Trib's aviation editor, and **Warren Smith,** Fairchild's PIO from Hagerstown, graciously gave out with "When Irish Eyes Are Smiling," and an encore number about the River Shannon. As they started back to the dance floor a gentleman, obviously overcome by sentiment, wavered up to Ansel, pressed a fiver into the Talbert palm, and earnestly requested "Mother Machree." He got it.

* * *

THAT'S A JOKE, SON—As you know, National's union and non-union pilots are a-feudin'. Well, on St. Patrick's Day one of the company's non-ALPA pilots phoned up the Flight Safety Foundation offices in New York and said there was nothing to the rumor that NAL was using green pilots that day.

* * *

THIS ABOUT KILT HIRAM—Hy Sheridan takes another fling at us between DC-6 hops with a no-doubt true story. One of American's reservations girls was just back in the states from a free trip on AOA to Sweden, so Hy eavesdropped:

"Just think, I came across in 15 hours," the girl said proudly, to which Sadie the Stewardess replied:

"You should have gone to Scotland, Honey, and you'd have come across in 15 minutes."

* * *

BITS ABOUT PEOPLE—Lowell Swenson resigns as general sales manager of Wagner Mfg. Co., Cedar Falls, Ia., to devote full time to Lowell H. Swenson & Associates, offering industrial counselling and marketing service. He will continue to live in Cedar Falls . . . **Theon Wright,** ex-press chief at TWA, has resigned from Wilson, Wright & Associates to join H. A. Bruno & Associates, public relations firm in NYC . . . If you want to get out of jury duty, as TWA's **Russell A. Garlin** of Reading, Pa., did, it's easy. Turn up in Iraq on the day the court clerk calls your name. TWA's **Ed Boughton** wonders how many other airlines have helped in this way . . . **Earl Slick** was in N. Y. last week and after lunch took this column's conductor to the Slick Airways Manhattan office. It is a two-room, third-floor walkup over the Chinese Village Restaurant on West 33rd St. The nearest office neighbor, so help us, is De Luxe Bridal Veils, Inc. There is also a brassiere company's office handy too, if you care to make anything out of that. We can assure CAB Slick's New York GHQ is strictly functional—no extravagance . . . TWA's board chairman, named **"Full Plane Pierson"** by Press Agent **Gordon Gilmore,** learned how completely his employes have taken Pierson's philosophy to heart. Traveling to an important board meeting he was approached at St. Louis by a new passenger agent who said, "Sorry, sir; if you're a non-rev, you'll have to get off. We've got a full plane." An older employe started apologizing but Pierson took it in good nature.

R.H.W.

WHAT'S NEW

New Books

"The Air League Book," a review of postwar aviation in the British Empire, compiled by 14 British aeronautical experts. Published by The Foley House Press, 31-36 Foley St., London, W.1, England. Price 12s 6d.

"Engineering Laminates," edited by Albert G. H. Dietz with a contributing staff of 24. Symposium of information on all types of laminates—covering design, methods of manufacturing, mechanics, properties, uses, and other characteristics. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price $10.

"Theory of Oscillations," by A. A. Andronow and C. E. Chaiken, a condensed and edited translation of the first comprehensive treatment of nonlinear oscillations ever published. Original work, by two leading members of the Soviet Institute of Oscillations, was published in Russian in 1937. Published by Princeton University Press, Princeton, N. J. Price $6.

"Proceedings of Fastener Manufacturers' Symposium," a 100-page book on American-British-Canadian unified screw threads as applied to fasteners. Available from the American Institute of Bolt, Nut and Rivet Manufacturers, 1550 Hanna Bldg., Cleveland 15, Ohio. Price $1.50.

Trade Literature

"Technical Bulletin No. 3," describing physical and chemical properties of Alox 350, used to control corrosion in internal combustion engines, turbine systems, hydraulic systems, etc. Available upon request to Alox Corp., 3917 Buffalo Ave., Niagara Falls, New York.

"Optical Glass at the National Bureau of Standards," description of production procedures, available from Government Printing Office, Washington 25, D. C. Price 15 cents.

"Catalog No. 30," a 12-page folder describing lightweight flexible hose products, available upon request to American Ventilating Hose Co., 15 Park Row, New York 7, N. Y.

"Mounted Wheels and Points," a booklet on use of equipment for offhand and precision work and grinding, available from Simonds Abrasive Co., Philadelphia, Pa.

ADVERTISERS INDEX

AVIATION WEEK
APRIL 4, 1949

A C Spark Plug Div., G.M.C. 43
Agency—D. P. Brother & Co., Inc.

Aeronca Aircraft Corp. 24

Airborne Accessories Corp. 8
Agency—Weber-Thomson Associates

Allison Division, G.M.C. ..... Fourth Cover
Agency—Kudner Agency, Inc.

Axelson Mfg. Co. 4
Agency—Heintz & Co., Inc.

Bendix Products Div. of Bendix Aviation Corp. ..... Third Cover
Agency—MacManus, John & Adams, Inc.

Burndy Engineering Co., Inc. 60
Agency—G. M. Basford Co.

Champion Spark Plug Co. 39
Agency—MacManus, John & Adams, Inc.

Clary Multiplier Corp. 56
Agency—Dana Jones Company

Clifford Manufacturing Co. 28
Agency—James Thomas Chirurg Co.

Consolidated Vultee Aircraft Corp. 48
Agency—Buchanan & Co., Inc.

Continental Motors Corp. 50
Agency—Wallace-Lindeman, Inc.

Dowty Equipment Ltd. 36
Agency—Hamill-Toms, Ltd.

Edison, Inc., Thomas A. 65
Agency—The Schuyler-Hopper Co.

Elastic Stop Nut Corp. of America 19
Agency—G. M. Basford Co.

Electric Storage Battery Co., The 47
Agency—Geare-Marston, Inc.

Esso Std. Oil Co. 27
Agency—McCann-Erickson, Inc.

Fairchild Engine & Airplane Corp. 5
Agency—Cecil & Presbrey, Inc.

General Electric Co. 23, 49
Agency—G. M. Basford Co.

Goodyear Tire & Rubber Co., Inc. ..... Front Cover
Agency—Kudner Agency, Inc.

Hansen Mfg. Co., The 32
Agency—Richard T. Brandt, Inc.

Kohler Co. 44
Agency—Roche, Williams & Cleary, Inc.

Lewis Engineering Co., The 56

Minneapolis-Honeywell Regulator Co. ..... Second Cover
Agency—Addison, Lewis & Associates

New Departure Div., G.M.C. 3
Agency—J. M. Hickerson, Inc.

Pastushin Industries, Inc., Vic 58
Agency—Lynn-Western, Inc.

Pesco Products Co. 40
Agency—Fuller & Smith & Ross, Inc.

Ryan Aeronautical Co. 61
Agency—Batten, Barton, Durstine & Osborn, Inc.

Saab Aircraft Co. 57
Agency—Allmanna Annonsbyran A. B.

Scintilla Magneto Div. of Bendix Aviation Corp. 37
Agency—MacManus, John & Adams, Inc.

Searchlight Section 62, 63

SKF Industries, Inc. 33
Agency—Geare-Marston, Inc.

Snap-On Tools Corp. 59
Agency—Scott, Inc.

Southwest Airmotive Co. 56
Agency—Wilhelm-Laughlin-Wilson & Assoc.

Sperry Gyroscope Co. 6
Agency—Charles Dallas Reach Co., Inc.

Standard Oil Co. of California 10
Agency—Batten, Barton, Durstine & Osborn, Inc.

Torrington Co., The 9
Agency—Hazard Advertising Co.

United Services for Air, Inc. 65
Agency—Besig & Company, Inc.

Whittaker Co., Ltd., Wm. R. 30
Agency—The McCarty Co.

PROFESSIONAL SERVICES 62

■

SEARCHLIGHT SECTION
(Classified Advertising)

EMPLOYMENT
Positions Vacant 62
Positions Wanted 62
Employment Agencies 62

EDUCATIONAL
Schools 62

BUSINESS OPPORTUNITIES
Offered 62

PLANES—EQUIPMENT
(Used or Surplus New)
For Sale 62-63

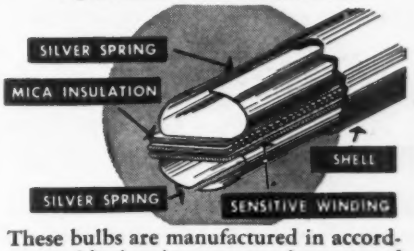
What Do You Look for in a THERMOMETER BULB?

Fast Response? Patented silver spring design of Edison Resistance Thermometer Bulbs provides maximum heat transfer and fast response. Time constant less than 2 seconds.

High Heat Range? Edison all-mica insulation, and metal-to-ceramic seal, permit operating temperatures up to 600° F.

Shock Protection? Silver springs inside Edison bulb stems cushion sensitive windings against shock.

Prompt Delivery? Immediate delivery of Edison AN Thermometer Bulbs for replacement or new installations.



These bulbs are manufactured in accordance with the rigorous requirements of Army-Navy Specification AN-B-19. Descriptive bulletin and prices on request.

154 Lakeside Avenue • West Orange, New Jersey

INSTRUMENT DIVISION
THOMAS A. EDISON, Incorporated

AVAILABLE NOW!

16 USair (C-46)

Standard Cargoversions

Excellent Aircraft — the choice of over 450 Surplus
Thoroughly Reconditioned with CAA Airworthiness Certificate
CAA Licensed under USair Type Certificate No. 789
Basic Weight reduced to less than 28,000 lbs.
Useful Load over 8½ tons
Complete with 2 Spare Zero Time Since Overhaul Engines

at $45,000 each

Over $1,000,000 in C-46 PARTS

USair Manufactured and Original Airframe Parts and Components
Thousands of Gaskets, Seals, Tires, Tubes, Valves, Batteries, De-Icer Boots
147 R-2800 Engines — Brand New and Zero Time Since Overhaul
$1,000 to $2,800 Each

Write, wire or phone for details today

Phone - BAiley 4100 — Cable Address - USair

UNITED SERVICES FOR AIR, Inc.

BUFFALO MUNICIPAL AIRPORT, BUFFALO 5, NEW YORK

Branch Base: Palm Beach International Airport, West Palm Beach, Fla.

EDITORIAL

Working Toward Sound Air Transport

Frankly critical of the air transport industry's economic policies, the chairman of the Civil Aeronautics Board has gone on record with a warning that we cannot "continue along the same lines in which we have been moving since the war, no matter how comforting to the airlines that course of action might be."

Chairman Joseph J. O'Connell, Jr., pointed out to the Association of the Bar of New York City that unlike even other public utilities, the industry need not meet the financial consequences of its own overproduction because the government meets them for it.

In short, Chairman O'Connell asserted the industry must get down to sound economic practices demanded in any other business.

This point, and the industry's frequent unwillingness to face hard business facts or permit any newcomers to live who try to, have been stressed by this page since AVIATION WEEK was established in 1947.

There has been some resentment in the industry because of this magazine's editorial policy, especially among those who felt that the present law and subsidy provisions could be continued forever. Aviation Week has always maintained that the industry ran a grave risk of killing the goose that laid its golden egg, unless it made honest effort to cut; instead of always increasing, its demands for public money. Leading, rather than echoing, industry opinion is a noble objective for a business magazine, but it had better expect bitter cries from those it is trying to help.

Now it is the chairman of the CAB who urges the industry to adopt economic policies.

Chairman O'Connell believes "we can and will succeed in recreating an atmosphere and a legislative framework in which air transportation can move forward on sound economic lines," but indicates this will not be possible without "incentives" for the carriers. In other words a law with a few additional teeth is necessary to make uneconomic operation more expensive to the carriers than it has been since 1938.

Mr. O'Connell doubts if the airlines are wastefully inefficient but questions whether they are economical, pointing out—for example—that the present act in Section 406(B), guarantees them subsidy insurance against bankruptcy provided they are "honest, economical and efficient." He cites capacity, routes and finances as instances where economic incentive is lacking.

"If we do not start to explore the ways in which these incentives may be provided, our air mail pay bill can be expected to continue to rise, but what is far more important, we may seriously and permanently undermine the economic soundness of our air transportation system because of the atrophy of the ability of airline management to behave like business men," the chairman said.

"The significant problem . . . is the effect which subsidy, great or small, may have on the airlines and whether in using the device of mail pay we are working toward a sound air transportation system of the type and size we want. Because I believe that the essence of our economic system lies in the freedom of large numbers of business men to make and execute sound economic decisions, I might say my chief concern over mail pay is whether or not it leads airline management to behave like business men and to make their decisions as business men normally do. . . .

"I am not sure that some of our air carriers have an economic management . . . and I believe there is a very definite relationship between what I would call a lack of economic management and the various aspects of air mail pay and subsidies. . . .

"The usual economic consequences of over-production in industry and other public utilities thus do not impinge on airline managements. The inevitable result has been, is and promises to be, the operation of excess capacity the costs of which are borne by the government."

Speaking of routes, the chairman emphasized that "a carrier is virtually assured that the government will make up any losses involved in operating a given route pattern, provided there is not flagrant over-scheduling. . . . It is, of course, the responsibility of CAB to lay out and maintain a sound and economic route pattern, but the . . . carriers are not likely to assist us so long as they are not provided with any economic incentive for so doing.

"What I have said . . . applies with equal force to . . . interchanges. Most of these that have been presented to the Board are based not upon a series of economic decisions but rather as defensive actions in an adversary proceeding. . . . The extent to which these proposals make economic sense is purely incidental. . . .

"What incentives are there either in the Act or in our mail rate action which make it imperative and compelling upon the carriers to finance themselves in the soundest conceivable way so that they will not only have adequate funds to meet their capital obligations, but also so that their capital structures may be reasonably depression-proof? . . .

"The record of the growth of airline debt since the war is almost irrefutable evidence of the lack of such incentives. In large part this incentive has been removed because the present act tends to operate as a shield between the air carriers, and the ultimate in economic penalties—bankruptcy.

"Bankruptcy is, after all, in private enterprise the principal astringent that we have for washing away uneconomic operations. In the air transportation business, as it is conducted today, this astringent is no stronger than water.

"It seems to me that because of this factor and perhaps also because the Board has no power to regulate the airlines' security issues, the financial structures of many of our air carriers have deteriorated to a remarkable extent."

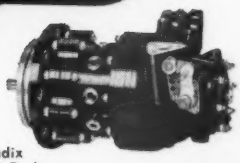
In discussing CAB's elaborate economic investigation program for 1949, Mr. O'Connell said differentiating between mail pay that is subsidy and that which represents fair compensation is needed by the Post Office, Congress and the people so they "can tell the cost of supporting the air transport system"; and needed by the airlines "in order to keep them under constant pressure to achieve self-sufficiency."

Between the two undesirable extremes of continuing on the present basis, or taking the meat-ax approach to subsidy, the chairman believes there is the road "we must follow if we are to continue the development of an air transportation system which is privately owned and managed and which rests on a sound economic foundation. . . ."

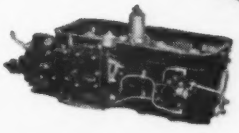
ROBERT H. WOOD

Bendix Products

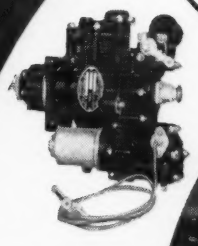
AIRCRAFT FUEL METERING SYSTEMS



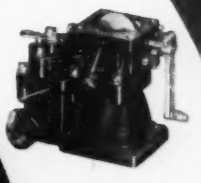
Bendix
Direct Fuel
Injection Pump.



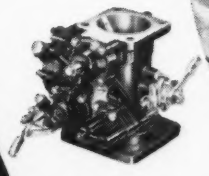
Stromberg* Injection
Carburetor
for large engines.



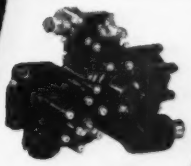
Bendix
Speed-Density
Fuel Metering Unit.



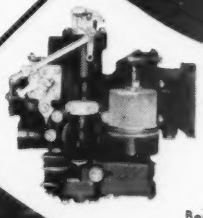
Stromberg
Float Type
Carburetor.



Stromberg* Injection
Carburetor for
personal planes.



Regulator for
Bendix Water
Injection System.



Bendix Fuel
Metering Unit for
jet engines.

In every field of
FUEL METERING
Bendix builds a leader

Regardless of the size or type of aircraft engines, Bendix Creative Engineering has the answers for better, more economical, power-producing Fuel Metering. Spray nozzles, pressurizing valves, divider valves and Speed-Density Control with the automatic starting system for turbojet engines round out a line of the most advanced and widely proved Fuel Metering devices available today. They're the choice for leading aircraft in every field. Plainly, when it comes to Fuel Metering, you'll do well to put it up to Bendix Products. Descriptive booklets will be sent in response to properly qualified inquiries.

BENDIX PRODUCTS

DIVISION of

SOUTH BEND 20, INDIANA

F-80 Lockheed Shooting Star

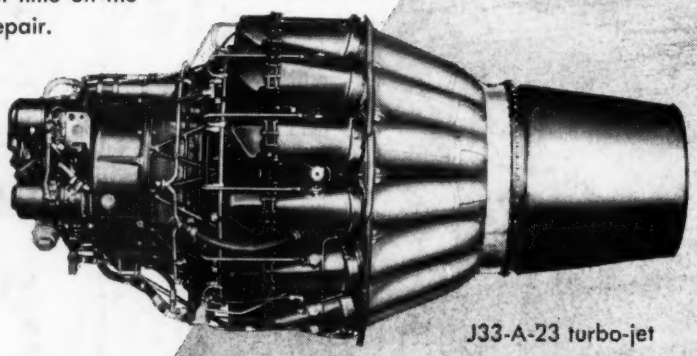
PROVED PERFORMANCE

With a total of more than 100,000 hours of actual flight time in their log book, Allison aircraft turbine engines have proved themselves with dependable performance under many varying conditions of service and of weather. Now operating 300 hours before overhaul, Allison J33 jet engines offer more useful service in the air with less lost time on the ground for service and repair.

Air Power is Peace Power

★ ★ ★

Other Allison powered airplanes:
Republic F-84 Thunderjet
North American FJ-1 Fury
Northrop YB-49 Flying Wing
Grumman F9F-3 Panther



J33-A-23 turbo-jet

Allison

Builder of axial and-centrifugal flow turbine engines

DIVISION OF GM GENERAL MOTORS

Indianapolis, Indiana